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THE PREPARATION OF CURRICULUM MATERIALS AND THE DEVELOPMENT OF TEACHERS FOR AN EXPERIMENTAL APPLICATION OF THE CLUSTER CONCEPT OF VOCATIONAL EDUCATION AT THE SECONDARY SCHOOL LEVEL. MALEY, DONALD
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REPORT RESUMES

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THE PREPARATION OF CURRICULUM MATERIALS AND THE DEVELOPMENT OF TEACHERS FOR AN EXPERIMENTAL APPLICATION OF THE CLUSTER CONCEPT OF VOCATIONAL EDUCATION AT THE SECONDARY SCHOOL LEVEL. ~~VOLUME II, INSTRUCTIONAL PLANS FOR THE CONSTRUCTION CLUSTER.~~

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DESCRIPTORS- *OCCUPATIONAL CLUSTERS, *CONSTRUCTION OCCUPATIONS, *TEACHING GUIDES, *TRADE AND INDUSTRIAL EDUCATION, *CURRICULUM GUIDES, GRADE 11, GRADE 12,

DESIGNED FOR USE WITH 11TH AND 12TH GRADE STUDENTS, THIS CURRICULUM GUIDE FOR THE OCCUPATIONAL CLUSTER IN CONSTRUCTION WAS DEVELOPED BY PARTICIPATING TEACHERS FROM RESULTS OF THE RESEARCH PROCEDURES DESCRIBED IN VOLUME I (VT 004 162). THE COURSE DESCRIPTION, NEED FOR THE COURSE, COURSE OBJECTIVES, PROCEDURE, AND INSTRUCTIONAL PLAN ARE DISCUSSED BRIEFLY. THE TASKS AND AREAS OF HUMAN REQUIREMENTS ARE ARRANGED IN AN INSTRUCTIONAL SEQUENCE FOR EACH OCCUPATION INCLUDED IN THE CONSTRUCTION CLUSTER--(1) CARPENTRY, (2) ELECTRICITY, (3) MASONRY, (4) PAINTING, AND (5) PLUMBING. SUGGESTED TEACHING METHODS, INSTRUCTIONAL MATERIALS, STUDENT ACTIVITIES, AND EVALUATION PROCEDURES ARE ARRANGED IN COLUMNS OPPOSITE EACH AREA OF HUMAN REQUIREMENT. AN INSTRUCTIONAL MATERIALS LIST CONTAINS BOOKS, FILMS, FILMSTRIPS AND PAMPHLETS. VOLUME III, INSTRUCTIONAL PLANS FOR THE METAL FORMING AND FABRICATION CLUSTER (VT 004 164) AND VOLUME IV, INSTRUCTIONAL PLAN FOR THE ELECTRO-MECHANICAL INSTALLATION AND REPAIR CLUSTER (VT 004 165) COVER THE OTHER TWO OCCUPATIONAL CLUSTERS DEVELOPED BY THE PROJECT. (MM)

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FINAL REPORT
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Final Report

Volume II

Instructional Plans for the Construction Cluster

August 1967

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Volume II

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Dr. Donald Maley

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INTRODUCTION

The volume for the occupational cluster of construction is the result of the research procedures which are described in Part I of the final report volume. The instructional plans for the cluster were developed by the teachers participating in the program. Each teacher seleced one of the occupations in the cluster and developed an instructional plan based on the tasks and areas of human requirement identified during the first phase of the project. The areas of human requirement are arranged in a suggested instructional sequence for each task in the occupation. The teaching methods, instructional materials, student activities, and methods of evaluation were then identified for each area of human requirement.

COURSE DESCRIPTION: The instructional plan for the occupational cluster of construction is designed to be used in a cluster concept program in vocational education at the secondary school level. The program is aimed at the development of skills and understandings related to a group of occupations within the construction cluster. It is not an in-depth development into any one occupation, but aims at preparing students to enter a number of occupations within the construction cluster.

NEED FOR THE COURSE: The course is designed to meet the needs of students pursuing a general curriculum in the secondary school system by providing job entry skills in a number of related occupations. It is also designed to meet the student's need for self appraisal of interests and potentialities in a number of occupations.

Specific needs include the following:

1. To provide students with the opportunity for a greater degree of mobility on a geographical basis.
2. To provide students with the opportunity for mobility within an industry or occupation.
3. To provide students with the opportunity for greater flexibility in occupational choice patterns.
4. To develop students who will be adaptable to technological changes.

COURSE OBJECTIVES: The course for the construction cluster will be directed toward the following objectives:

1. To broaden the student's knowledge of the available opportunities in occupations found in the construction cluster.
2. To develop job entry skills and knowledge for several occupations found in the construction cluster.
3. To develop a favorable attitude toward work in the construction cluster.
4. To develop a student's insight into the sources of information that will be helpful to him as he moves through the occupational areas.

The specific objectives for the course are the following:

1. To develop the student's competency in the use of common hand tools found in the construction cluster.
2. To develop the student's competency in using power tools and equipment needed for job entry into the occupations found in the construction cluster.
3. To develop the student's understanding of the operations, procedures, and processes associated with the construction cluster.
4. To develop safe working habits related to the occupations within the construction cluster.

5. To familiarize the student with the terminology associated with the construction cluster.

6. To develop an understanding of the resources available to him in his pursuit of the course as well as in his work following graduation.

PROCEDURE: It is recommended that the course be offered during the student's junior and senior year in high school. Instruction should be provided for two periods a day, five days a week, during the school year.

The most appropriate facility would be a self-contained laboratory unit containing the essential tools and equipment necessary for teaching job entry tasks in the construction cluster.

The instructor should be a person with some experience and competence in the occupations included in the cluster. The course should be organized by the teacher on a multiple activity basis with groups of students rotating through the specific occupational areas. The common areas of human requirement needed to perform the tasks in the cluster should be emphasized so that an opportunity is provided for the students to transfer the common skill or knowledge from one occupation to another.

The possibility of team teaching procedures would be appropriate for the construction cluster. Specialists in the different occupational areas would participate in the instructional program. The team teachers could be other vocational teachers as well as competent individuals from the community.

The instructor of the course should coordinate his program with other teachers in the school to develop the competencies in mathematics, science, and communication that will be needed for successful performance in the occupations found in the construction cluster. Community resources, such as local industries, employment agencies, and tradesmen should be utilized to provide occupational information and knowledge needed concerning the performance of the tasks in the construction occupations.

INSTRUCTIONAL PLAN: The following section of the volume presents the instructional plan for the construction cluster. The tasks and areas of human requirement are arranged in an instructional sequence for each occupation. Suggested teaching methods, instructional materials, student activities, and evaluation procedures are found opposite each area of human requirement. Instructional plans for occupational information are found at the end of each occupation. The plan sheets in the volume provide teachers with the information needed to implement a construction cluster concept program at the secondary school level.

CARPENTRY

TASK NO. 1: MIXING MORTAR FOR MUD SILLS OF A HOUSE

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading instructions on container to mix proportions.	Listing key words most likely to be encountered	Textbook, Practical Carpentry, pp. 11-30.	Writing mixing directions in notebook.	Oral procedure test on steps in mixing mortar ingredients properly
Mixing proportions to suit the quantity needed.	Discuss and explain the meaning of porportion and ratio . Demonstrating how shovel may be used to obtain proper proportions of ingredients.	Chalkboard for problem work on ratio and proportions. Portland cement Sand Water Mortar Box Shovel Hoe	Measuring out and mixing ingredients into proper mortar	Oral procedure test on steps in mixing mortar ingredients properly.
Proper care of tools after use.	Demonstration of cleaning tools.	Water Wire Brush	Cleaning tools with water and wire brush.	Check tools after being cleaned.
Safety and protection of oneself	Listing rules on safety on chart or chalkboard	Chalkboard Poster Board Felt Tip Marker	Listing safety precautions in notebook. Continuous Assignment: Begin to read Miscellaneous Helpful Information, pp. 369-398, Practical Carpentry. This assignment will continue throughout the year.	Written or oral test on safety involved when working with mortar. Evaluation of material in notebook.

TASK NO. 2: CONSTRUCTION OF A SAW HORSE FOR TRESTLE ON CONSTRUCTION SITE.

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading a plan to determine size and construction of a saw horse.	Explaining why certain wood and sizes are used.	Plans Text: Practical Carpentry, pp. 32a-32p	Sketching possible improvement in the design of saw horse plans in text: Practical Carpentry, page 32.	Oral presentation and explanation of sketches.
Measuring size of material within 1/16 of an inch.	Overhead Projector Demonstrating how to use rule.	Folding rule Overhead Projector Teacher Made Transparencies	Using rule to practice measuring on scrap lumber.	Written test on the divisions of an inch on a folding rule.
Using power tools safely	Demonstrating how to use power tools safely.	Cross cut band saw Radial Arm Saw Portable Saw	Listing safety rules to follow in using power equipment.	Written test on safety rules in using power equipment.
Laying out length and angles to be used within accuracy of 1/16 of an inch	Demonstration of use of framing square to determine angles.	Framing square 2 X 4 Lumber	Using framing square and rule to measure stock for cutting.	Observation of student measurements.
Nailing parts together to an accuracy of 1/16 of an inch.	Demonstrating proper use of hammer. Film	Claw Hammer, 12D Nails "The Carpenter", The Hutcheson Co., WSOE, 52 min., Color.	Using hand saw, portable saw or radial saw to cut stock into various parts. Using hammer and nails to assemble parts. Viewing film.	Check stock for accuracy after cuts have been made. Observation and oral questions during student's use of hammer and nails to assemble the parts of the saw horse. Discussion of film.

TASK NO. 3: CUTTING BUILDING MATERIAL FOR A HOME.

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading blueprint to determine size and type of materials.	Review of plans and types of construction materials.	Blueprint of house	Reviewing of blueprints and various building materials.	Identification of materials such as nails, lumber , insulation, etc. Observation.
Measuring stock to accuracy of 1/16 of an inch.	Review use of rule	Scrap Stock: 2 X 4 2 X 8 1 X 6 Scrap Moulding Rule	Using rule to measure scrap materials.	Observation of student's measurements.
Squaring and marking material to be cut.	Demonstrating use of tape and framing square	Framing Square Rule Steel Tape	Using rule, tape and framing square to measure and mark material.	Observation of student's measurements.
Realizing importance of speed and accuracy in cutting multiple parts.	Demonstrating use of patterns for multiple cuts.	Scrap Lumber or Fixture for marking multiple parts.	Using patterns or fixtures to mark off parts to be cut using hand saw, portable saw or radial-saw to cut material.	Observation of student's performance of the task.
Using a hand saw, portable saw or radial arm saw to cut measured and marked building material.	Demonstrating use of hand saw, portable saw, and radial arm saw.	Hand Saw Portable Saw Radial Arm Saw Scrap Lumber	Assignment: Begin to study Chapter 9 (Blueprints and Specifications) pp. 255-284, Carpentry for the Building Trades. This assignment will continue through the year.	Check for uniformity and accuracy of cuts made.

TASK NO. 4: ERECTING WOODEN GIRDERS AND COLUMNS

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading plans to determine size and location of girders and columns.	Class Discussion Explain why members are placed in certain places.	Textbook: Practical Carpentry, p. 57.	Review Plans. Study text assignment on girders and columns.	Oral or written test.
Selecting proper wood to make up girders and columns.	Explain what types of wood are best to use for columns. Overlay Presentation	Textbook: Practical Carpentry, pp. 32a-32p. Overhead Projector Teacher Made Transparencies	Sort out proper wood to use in making girders and columns.	Quiz students on wood identification and selection.
Measuring girders and columns to accuracy of 1/16 of an inch.	Demonstration of use of steel tape and rule	2 X 8 X 12 Fir Lumber 4 X 4 Columns Steel Tape Folding Rule	Measure girders and columns to accuracy of 1/16 of an inch. Assignment: Carpentry for the Building Trades, pp. 18-28. Assignment: Written report on the woods used in carpentry.	Simple test in adding, subtracting measurements. Oral presentation of written report.
Bevel and cut ends of girders to accuracy of 1/16 of an inch.	Direct group activity	Framing Square Hand Saw Electric Saw	Bevel and cut ends of girders using electric, saw and hand saw.	Performance.
Fastening joints with hammer and nails to the accuracy of 1/16 of an inch.	Explain why joints should be staggered and material should be crowned.	Hammer 16D Nails 2 X 8 X 12 Fir Lumber 4 X 4 Columns	Fasten joints of members of girder with hammer and nails. Staggering joints and nails.	Performance
Placing bearing plates with screws and screwdriver on girders to an accuracy of 1/16 of an inch.	Direct activity of group	Screws Screwdriver Bearing Plates	Place and fasten bearing plates with screws and screwdriver.	Performance
Placing girders in place and leveling. Nailing temporary supports to hold in place while plumbing columns.	Demonstration on use of level and use of temporary supports on erecting girders.	Dry Line Level 2 X 4 Braces	Place girders in place. Level and nail temporary supports until columns are fastened and plumbed.	Performance
Placing and plumbing 4 X 4 columns in place at the bearing plates.	Assist group in use of level to plumb columns	Level 4 X 4 Columns	Practice using step ladders and other devices safely.	Performance
Using step ladders and other devices safely while erecting girders and columns	Observe and direct group in safe use of step ladder and other devices.	6' Step Ladder Saw Horses	Listing safety rules in using electrical equipment.	Oral and written test.

TASK NO. 5: FRAMING A BOX SILL (SILL PLATE AND HEADER) FOR A HOME

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading a blueprint to determine sizes, length and location of sills, joists and headers.	Review of special terms and names of various parts	Blueprint Textbook, Practical Carpentry, p. 63. Chalkboard	Review of blueprints to determine location of various parts.	Oral or written test.
Laying out stock with a rule and framing square to an accuracy of 1/16 of an inch.	Dividing class into groups to mark various parts.	Rule T Tape Framing Square 2" X 8" X 12' Lumber	Laying out stock and marking with a rule to an accuracy of 1/16 of an inch.	Observing and Performance.
Marking rim joists with tape. Framing square and pencil for placement of floor joists.	Overseeing and directing activity	Tape Framing Square Pencil	Marking rim joists with tape framing square and pencil.	Performance.
Drilling holes in sill plate by brace and bit or electric drill.	Demonstration of proper use of brace and bit and electric drill.	Brace and Bit (3/4") Electric Drill and Bit	Using Brace and Bit on electric drill to drill holes in plate.	Performance.
Mounting sill plate to masonry with adjustable wrench.	Directing activities of groups. Present and discuss scale model of box sill.	Adjustable Wrench Taps for bolts Model of box sill, Brodhead-Garrett Co.	Mounting sill plates to masonry with adjustable wrench.	Performance.

TASK NO. 6: INSTALLING HANGERS AND ANCHORS FOR FLOOR JOISTS.

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading a blueprint to determine types and placement of hangers and anchors.	Discuss placement with class.	House blueprints Practical Carpentry, Page 70.	Reading blueprints to determine type and placement of hangers and anchors.	Oral placement quiz.
Marking bolt holes on joists for anchor or hanger with rule and square to an accuracy of 1/32 of an inch.	Lecture Demonstration Drawings of location of hangers and anchors	Rule Framing Square Carpenter's Pencil Electric Drill Wrench Anchor or Joist Hanger 9D and 4D Nails Claw Hammer	Marking bolt holes on joists for anchor or hanger with rule and squares to an accuracy of 1/32 of an inch.	Evaluate student performance in installing hangers and anchors for floor joists.
Boring holes in joists with electric drill.			Boring holes in joists with electric drill.	
Securing anchor or hanger in place with adjustable wrench			Securing anchor or hanger in place with adjustable wrench.	
Nailing hanger or anchor in proper location.			Nailing hanger or anchor in proper location.	
Removing bent nails.			Removing bent nails.	

TASK NO. 7: ERECTING FLOOR AND CEILING JOISTS FOR A HOME.

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading a blueprint to determine length and placement of joists.	Review blueprints with group.	Blueprints Chalkboard Textbook: Practical Carpentry, pp. 65-98.	Studying blueprints. Text.	Oral and written questions.
Measuring joists for length and placement with rule and tape.	Observing group for accuracy	Rule Tape Pencil	Using rule and tape to measure correct length of joists.	Observing performance.
Marking the location of joists according to specifications.	Using Framing Square to mark 16" X 24" centers	Framing Square	Using framing square and pencil to lay off and mark joist spacing.	Observing performance.
Handling and placing joists in proper location with crown up.	Explaining and demonstrating how to crown lumber.	2 X 8 joist lumber	Handling and placing joists into proper position with crowns up.	Observing performance.
Nailing joists into position on to sill plate.	Proper nailing method. Demonstrate use of hammer in toe nailing.	16D Nails 16 or 20 oz. Hammer	Nailing joists into sill plate with hammer.	Observing performance.
Nailing band or rim joists into position.	Placing rim joists to prevent waste. Splicing Lumber.	2 X 8 Lumber	Nailing band or rim joists into position.	Observing performance.

TASK NO. 8: INSTALLING CROSS BRIDGING BETWEEN FLOOR JOISTS FOR A HOUSE.

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading a blueprint to determine size of stock to be used and location of bridging.	Lecture	Blueprint Textbook: Practical Carpentry, pp. 72-77.	Reviewing blueprint	Have students sketch the arrangement of cross bridging.
Construction of an adjustable rig to cut multiple pieces of bridging.	Sketch plan on board. Construct same.	Rule Chalk 2 X 4 Lumber 1 X 4 Lumber	Assist in constructing a bridging cutter.	Observation of student performance.
Cutting bridging on rig after length and angle have been established.	Demonstration of use of power saw to cut bridging	1 X 3 Lumber Power Saw	Cutting bridging on rig for multiple cuts.	Observation of student performance.
Nailing both ends of bridging before application. Nailing Bridging.	Demonstration of nailing of bridging. Charts showing cross bridging.	Hammer 6D Nails Teacher made charts of cross bridging.	Nailing both ends of bridging before application. Nailing bridging in the construction of the group project.	Test students on how bridging: 1. Stiffens floors 2. Distributes the load 3. Holds joists in alignment 4. Helps prevent warping 5. Is nailed in place 6. Involves certain safety procedures Identification test of carpentry symbols and conventions.

TASK NO. 9: INSTALLING SOLID BRIDGING BETWEEN FLOOR JOISTS FOR A HOUSE

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading blueprint to determine location of solid bridging.	Observe and direct study of blueprint reading.	Blueprints Chalkboard Textbook: Practical Carpentry, pp. 90-95.	Reviewing plans for proper location of bridging.	Question and answer session.
Knowledge of how bridging works to strengthen joists.	Explaining how bridging works.	Chalkboard Text	Sketch arrangement of solid bridging.	Evaluate student sketches.
Using chalk line to mark areas where bridging is to be nailed.	Work with students in marking off area.	Chalkline Rule	Using chalk line to mark areas where bridging is to be nailed.	Observation
Measuring and cutting solid bridging.	Demonstration use of rule, framing square and power saw.	Rule Framing Square Power Saw 2 X 8 Lumber	Measuring squaring cutting. Solid bridging.	Observing Performance. Test on the sequence in installing cross and solid bridging.
Nailing solid bridging in place with 16 or 20 oz hammer.	Demonstration of offset spacing. Film Strip	Hammer 16D Nails Precut pieces of bridging. "Safety Knowhow in the Workshop," WSOE, 55 frames	Nailing solid bridging in place with hammer.	Observe student performance and check for accuracy of finished work.

TASK NO. 10: LAYING SUBFLOORS ON FLOOR JOISTS PLYWOOD

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Blueprint reading	Review with students.	Plans Textbook: Practical Carpentry, pp. 76-77.	Study Plans. Text.	Observing
Marking off with rule and chalkline for first course of plywood.	Demonstration	Rule Chalkline	Marking off joists with rule and striking chalkline.	Performance.
Staggering the pieces of plywood for proper alignment.	Directing Activity	1/2" Plywood Scrap	Laying plywood in proper alignment.	Performance.
Placing and nailing plywood subfloor	Directing activity	Hammer 6D Nails	Nailing plywood spacing nails every 6 inches.	Performance.
Trimming overlapping ends and cutting special pieces for openings.	Directing Film Demonstration	Power Saw Hand Saw "Language of Drawing -- Shape Description" - Part I and II, McGraw-Hill, 30 min.	Trimming overlapping ends and cutting special pieces for openings. Assignment: begin to list materials (other than wood) used in carpentry.	Performance.

TASK NO. 11: FRAMING BATHROOM FLOORS FOR A TILE FLOOR

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading drawing to determine method to be used in dropping floor.	Explanation of method. Lecture and overlay presentation.	Plans Textbook, Practical Carpentry, pp. 76-77 Teacher made overlays of floor framing	Reading Plans. Reading text. Assignment: Chapter 2, pp. 19-41, pp. 76-77, Carpentry Mathematics.	Oral or written test on the different methods of recessing a tile bathroom floor.
Measuring to determine where to nail furring strips.	Assist in measuring for strips	Rule or Tape Chalkline	Measuring and marking off position of strips.	Observance.
Layout and cut necessary material for the job.	Observing activity	1 X 3 furring strips Power Saw Hand Saw Framing Square	Laying out and cutting stock.	Performance.
Nailing strips into place.	Assistance Demonstrating	8D Nails Hammer	Nailing strips into place.	Performance.
Drilling Holes.	Marking off positions	Electric Drill or Brace and Bit	Drilling holes with electric drill and brace and bit.	Math test on dimensions to determine the amount of recess for bathroom floor and to cut stock to the correct dimensions.

TASK NO. 12: BUILDING UP CORNER POSTS FOR CORNERS OF FRAMING

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading blueprints to determine method and material used for building the corner post and partition post.	Lecture Chalkboard illustrations	Chalkboard Blueprints Textbook: Practical Carpentry, p. 81.	Study plans. Select proper straight material.	Observing student performance.
Measuring and marking 2 X 4 stock to the specified length.	Overseeing students	2 X 4 Lumber Rule or Tape	Measuring lumber and marking accurately.	Observing student performance.
Squaring stock and cutting to specified length.	Observing Explaining Demonstrating	Framing Square Portable Saw Radial Arm Saw Saw Horses	Squaring and cutting stock.	Observing student performance.
Nailing cut stock together	Safety Lecture Demonstration Model (scale) to corner post build-up	16D Nails Teacher made model	Nailing stock together to form a post.	Observing student performance. Written test listing and discussing the various methods of constructing corner posts.

TASK NO. 13: LAYING OUT STUD SPACING FOR WALLS AND PARTITIONS.

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading blueprint to determine stud placing.	Review Plans with class	Plans Text: Practical Carpentry, pp. 76, 77, and 78.	Reading and reviewing text and plans.	Determine location of studs from house plans.
Measuring and marking off for stud placement on sole plate and top plate.	Observe Direct Activities	Rule Framing square	Measuring marking off for stud placement - Tap and Sole Plate.	Observe performance.
Measuring and marking off sills, headers, and jacks for window and door openings.	Direct Observe	Rule Framing Square	Measuring, marking off for sills, headers, jacks for window and door openings.	Observe performance.
Measuring and cutting studs, sills, jacks, and headers.	Direct Demonstrate multiple cut method. Charts showing stud spacing.	2 X 4 Studs and Sills 2 X 6 Headers Teacher made chart	Measuring and cutting stock for studs, sills, jacks and headers.	Observe performance Oral exam on the function of studs.

TASK NO. 14: ASSEMBLING WALLS AND PARTITIONS FOR A HOUSE

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading blueprint to determine location of studs and openings.	Reviewing plans with class	Blueprints Practical Carpentry, pp. 83-91	Reading, reviewing to determine location of studs, headers, jacks, and sills.	Observe performance.
Laying out cut pieces on the deck according to the markings on the sole plate and top plate.	Work with group in placing parts into position.	2 X 4 studs Jacks Sills Headers Sole and Top Plates	Layout parts to be assembled.	Observe performance.
Nailing parts together	Work with group Demonstrate Tape recording of conversation with carpenter on assembling walls and partitions.	16D Nails Hammer Teacher made tape recording.	Nailing parts together. Assignment: Written report on types of walls in carpentry.	Observe performance. Evaluate student reports Class discussion of walls and partitions. (Question and answer session)

TASK NO. 15: ERECTING, PLUMBING AND BRACING WALL SECTIONS FOR A HOUSE

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Receiving verbal instructions on procedure from contractor	Dramatized technique teacher-contractor students-workers	House Plans Practical Carpentry, pp. 83-91 Instruction Sheet	Taking and following directions.	Short quiz on instructions and directions.
Raising partition in upright position by several members	Discussion of lifting technique. Overlay presentation and demonstration.	Teacher prepared overlays Overhead Projector	Raising partition in upright position.	Oral question and answer session on lifting techniques.
Nailing sole plate to deck markings.	Direct activity	Hammer 16D Nails	Nailing sole plate to deck marking.	Observe student performance.
Nailing temporary braces to blocks on deck	Demonstration	2 X 4 Blocks and Braces	Nailing temporary braces to blocks on deck.	Observe student performance.
Plumbing partitions with a level and straight edge.	Demonstration	Straight Edge Level	Plumbing partitions with a level and straight edge.	Observe student performance.
Nailing diagonal bracing (temporary) with a hammer and nails.	Demonstration	Long 2 X 4 Braces 16D Nails Hammer	Nailing diagonal bracing (temp) with hammer and nails.	Observe student performance.

TASK NO. 16: APPLYING SHEATHING (LAP PLYWOOD OR COMPOSITION) FOR A HOUSE

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading blueprints to determine the type to be used.	Lecture	Blueprints Practical Carpentry, pp. 125-130. U.S. Gypsom film.	Study text on purposes and types of sheathing, pp. 125-130.	Question-answer period.
Determing where full 4 X 8 corner sheets are to be used.	Lecture	Text Chalkboard	Study text on purposes and type of sheathing	Question-Answer Period
Cutting and nailing plywood or 2' X 8' composition into place.	Demonstration use of stagger joint method	Rule Square Portable Saw or Razor Knife Chalkline Plywood or composition 1 1/4" Roofing Nails	Cutting and nailing plywood or composition in place.	Observe student performance.
Handling large sheets of composition or plywood.	Demonstration		Assignment: Written report on sheathing.	Evaluate reports of students.

TASK NO. 17: INSTALLING FIRE STOPS BETWEEN STUDDING OF A HOUSE (STRUTS)

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading plans to determine placement of stops.	Direct Study of plans and text.	Plans Practical Carpentry, pp. 90-91.	Study plans and text, pp. 90-91. Sketch location of firestops.	Short quiz listing practical methods of fire stopping. Check student sketches.
Measuring distance between studs at base to determine length of stops	Observe and direct a activity	Rule Square	Measuring distance between studs to determine length of stops.	Performance.
Utilization of short leftover 2 X 4's to make up stops		Short 2 X 4 Scraps	Selecting scrap materials to make stops.	Performance.
Cutting marked stock	Demonstration Safe use of portable saw	Portable Saw Hand Saw	Cutting marked pieces of stock.	Performance.
Marking studs to determine height. Placement of stops.	Demonstration of staggered method.	Rule Chalkline	Marking studs to determine height of stops.	Performance.
Nailing stops into place.	Demonstration	Hammer 16D Nails	Nailing stops into place.	Performance.

TASK NO. 18: INSTALLING STAGING BRACKETS FOR HOUSE CONSTRUCTION

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Understanding why staging brackets are necessary.	Review Discussion	Diagram on blackboard	Reading text or reference books	Question and answer session on staging brackets.
Determining proper height to bore holes for fastening staging	Explanation of reasons for certain height.	Rule Tape	Using tape or rule to measure proper height.	Performance.
Boring holes with electric drill or brace and bit in backing plate.	Demonstration of activity	Brace and Bit Electric Drill	Boring holes with electric drill or brace and bit.	Performance.
Nailing backing plate at proper height on studs.	Demonstration Observance	16D Nails Hammer	Nailing backing plate at proper height on studs.	Performance.
Leveling and securing brackets with bolts.	Assist students	Bolts Taps or wing nuts Level Wrench	Leveling and securing brackets.	Performance.

TASK NO. 19: INSTALLING SINGLE OR DOUBLE POST SCAFFOLDING FOR HOUSE CONSTRUCTION

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Instructions on type and size of scaffold and materials to be used.	Lecture	Lumber Assortment Text: Carpentry For The Building Trades, pp. 235-253. Practical Carpentry, pp. 370-371.	Reading text. Types of scaffolding, pp. 370-371.	Question and answer period.
Measuring for proper height of ledgers	Assist students	Rule Tape Chalk	Measuring to determine height of ledgers.	Performance.
Cutting blocks and posts to be used for supports	Direct cutting of parts	Hand Saw Electric Saw 2 X 4's	Cutting blocks and posts.	Performance.
Nailing blocks to posts to prevent sinking in soft earth.	Assist Class	16D Nails Hammer	Nail blocks to posts.	Performance.
Erect and plumb post	Demonstrate Use of Level Film	Level "Ladders, Scaffolds, and Floor Openings," Aetna Life Affiliated Companies, 151 Farmington Avenue, Hartford, Connecticut.	Erect and plumb post.	Performance.
Securing posts to walls with diagonal bracing.	Review of text. Lecture on reasons for diagonal bracing	Text Chalkboard Hammer Nails	Nailing to secure posts to walls.	Observing performance.
Determining where to nail toe boards	Assist and Direct students	2 X 4's	Nailing on toe boards	Performance.
Laying planks across ledgers	Assist and direct students	2 X 10 planks	Laying planks across ledgers.	Performance.
Nailing on handrail at proper height above planks	Direct and assist students	2 X 4's Hammer 16 D Nails	Nailing on hand rail.	Performance.
Sharpening stakes	Demonstration	Hatchet or Axe	Sharpening stakes	Performance.
Driving stakes and applying braces	Demonstration	Sledge Hammer	Driving stakes and applying braces.	Performance.

TASK NO. 20: FRAMING A FLAT ROOF FOR A HOME

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading a blueprint to determine the size of stock, overhang, method and spacing of joists.	Lecture and sketching on chalkboard to simplify	Blueprints Practical Carpentry, p. 122. Chalkboard	Read text and reference books on Roof Construction, text, p. 122.	Observe Question and answer period.
Laying out cuts to be made on pattern material lumber	Work with group and demonstrate	Rule Tape Framing Square	Laying out cuts to be made on pattern.	Performance.
Cutting pattern to be used in multiple cuts. Cutting other joists as needed.	Work with group and demonstrate	Electric Saw Hand Saw 2 X 8 Lumber	Cutting with electric saw.	Performance Observation
Laying cut joists with crowns up 16 inches on center.	Show group how to determine crowns.	2 X 8 Lumber Cut Joists	Placing cut joists in position with crowns up, 16 inches on center.	Performance.
Nailing joists in place.	Demonstration of toe nailing	Hammer 16D Nails	Nailing joists in place.	Performance.
Nailing lookout rafters into wall plate and header with hammer.	Assist groups	Hammer 16D Nails	Nail lookout rafters into wallplate	Performance.
Nailing on rim joists to joists	Assist Group	Hammer 16D Nails	Nail rim joists to joists.	Performance.
	Film	"Framing: Rafter Principles and Common Rafters". United World Films, Inc., 1445 Park Avenue, New York.	Assignment: Written report and accompanying sketches of the various rafters.	Evaluate reports.

TASK NO. 21: INSTALLING GABLE STUDS FOR A HOUSE

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading a blueprint to determine the location of studs.	Review Plans with group	Chalkboard Plans Text: Practical Carpentry, pp. 114-115	Review blueprints, text and references on gable studs.	Question and answer period.
Cutting studs to the proper length and angle and slope	Demonstrate setting of electric saw for cutting various angles	2 X 4 Studs Square Rule Electric Saw	Cutting studs with electric saw.	Performance.
Nailing studs directly over wall studs	Demonstrate and explain why this placement of studs	16D and 8D Nails Hammer	Nailing studs in proper places.	Performance.
	Present and discuss scale model of gable studs	Teacher made model		

TASK NO. 22: LAYING ROOF SHEATHING FOR A HOUSE

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading blueprints to determine the type, method and size of sheathing.	Review of text plans with class	Blueprints Text: Practical Carpentry, 170-172. References	Reading a blueprint. Reading Text.	Question and answer period
Measuring and striking chalkline for first course of plywood.	Demonstrate and explain reasons for staggering plywood.	1/2" Plywood Chalkline	Measuring and striking chalk line, 4ft. from lower part of rafters.	Performance.
Applying and tacking full sheets of plywood for first course on lower level.	Assist Class	Hammer 6D Nails Coated Nails	Applying and tacking first course of plywood.	Performance.
Fastening clips between each rafter.	Demonstrate and explain purpose of clips between rafters.	1/2" Plywood Clips	Fasten clips between rafters.	Performance.
Cutting parts of sheets to fill in open ends and final course.	Demonstration of cutting 4 X 8 plywood with portable saw.	Plywood Chalkline or Straight Edge Portable Saw Saw Horses	Cutting parts of sheets to fill in open places and final course.	Performance.
Nailing plywood at 6" intervals into rafters.	Assist class Film	Hammer 6D Coated Nails "Outside Story," 25 min., United States Gypsum Co., 300 W. Adams Street, Chicago, Ill.	Nailing plywood to rafters.	Performance.

TASK NO. 23: APPLYING BUILDING PAPER TO A WALL, ROUGH FLOOR AS ROOF SHEATHING

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Blueprint reading to determine type and application.	Demonstrate and explain types of building paper and uses.	Plans. Text, pp. 127, 190, 332. References, Carpentry for the Building Trades, pp. 79-81.	Reading on text and plans about building paper.	Question-answer session
Measuring rolled out paper and cutting from roll.	Demonstration and assistance.	15 lb. Paper Roofing Knife.	Measuring rolled out paper cutting strips from rolls.	Performance.
Fastening paper from bottom up overlapping each strip.	Demonstrate and explain importance of straight first strip of paper. Show samples of different building paper.	Hammer, Stapler Roofing Nails (Tabbed) Building Paper Samples	Fastening paper from bottom up to roof deck.	Performance. Written quiz on information on pp. 79-81 of reference.

TASK NO. 24: BUILDING FOOT REST FOR SHINGLING A ROOF

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Receiving instructions for a foot rest, foot lock or roof bracket.	Showing and explaining the various types of safe rests on roofs of a steep pitch.	Chalkboard	Reading worksheet text and related materials for foot rests. Assignment: Written report on different kinds of roofing material.	Oral or written short answer test on various types of foot rests. Evaluate reports
Measuring materials to size with rule or tape.	Discuss and review measuring techniques.	Tape or Rule 2 X 4's Knot free	Measuring squaring and cutting materials for foot rests.	Performance.
Squaring and cutting materials with hand saw or electric saw.	Direct student activity	Framing Square Electric Saw	Squaring and cutting material with hand saw or electric saw.	Performance
Attaching metal roof brackets to a roof.	Demonstrate	Hammer 6D Nails Metal Roof Brackets	Attaching brackets to roof.	Performance.
Using ladders in various ways to work on roof.	Demonstration of various techniques. Rope Method.	Extension Ladder Rope Ladder Hooks	Practice using ladders safely.	Questions on ladder safety (oral or written)
Constructing a cleated board with brace to hold it to the peak of the roof.	Work with group and direct construction.	2 X 8 Plank 1 X 3 For Cleats 6D Nails Hammer Saw	Making a cleated board with brace to hold it on peak of roof.	Observation and performance.
Remove bent nails with hammer or bar.	Direct activities	Hammer Bar	Remove bent nails	Observation
Placing a cross piece or foot rest across roof supports	Direct group on placement of rest.	2 X 4 Material	Attaching a cross piece across roof supports.	Performance.

TASK NO. 25: INSTALLING A METAL OR PLASTIC DRIP EDGE ON A ROOF FOR A HOUSE

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Measuring edge of roof deck to determine proper lengths of metal or plastic to be used.	Show and explain reason of installing drip edge to roof. Opaque Projector Presentation.	Text: "Practical Carpentry", pp. 182-183. Rule Tape Opaque Projector Teacher selected pictures of drip edges.	Measuring distance. Reading Text. Taking Notes.	Question-answer period. Written Test.
Cutting metal with snips or hacksaw within an accuracy of 1/16 of an inch. Cutting plastic with knife.	Demonstration of safe and proper use of hacksaw and hacksaw and knife.	Snips Hacksaw Rule Square Knife.	Cutting metal with snips or hacksaw. Cutting plastic with knife.	Observation and performance.
Nailing metal or plastic to edge of roof to an accuracy of 1/16 of an inch.	Observe and assist groups.	Hammer Roofing Nails Tabs	Nailing metal or plastic to edge of roof.	Performance.

TASK NO. 26: APPLYING ROLL ROOFING TO A HOUSE

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading directions on materials for application of cement and nailing pattern.	Review and discuss continuous word assignment, pp. 383, Practical Carpentry.	Chalkboard Packing Directions Textbook: "Practical Carpentry," p. 183-184	Read instructions on material to be used. Read pp. 183-184 in text, Practical Carpentry.	Oral and written test.
Nailing pieces of tin over holes.	Show and explain size of holes to be covered 1" or larger.	22 Gage Metal Roofing Nails	Nailing pieces of tin over holes.	Performance.
Rolling out roll roofing on ground to expose to sun or in warm flat area.	Demonstrate and explain rolling out to avoid cracking.	Roll Roofing	Rolling out roofing material to warm	Performance.
Laying out lines on roofing paper to accuracy of 1/8 of an inch.	Assist class in lining off paper. Review measuring techniques.	Rule Framing Square Chalkline	Laying out lines on roofing.	Performance.
Nailing roofing paper in place as it is rolled out on roof to an accuracy of 1/8 of an inch.	Explain importance of an accurate first course.	Hammer Roofing Nails Roll Roofing	Nailing roofing in place on roof to an accuracy of 1/8 of an inch on starting line.	Observe accuracy of students and advise.
Cutting off ends allowing for a slight overlap.	Demonstrate use of knife.	Roofing knife	Cut off overlapping ends with knife.	Observation.
Cement joints in roofing with brush and tar.	Demonstration of use of brush and tar.	Brush Tar Cement	Cement joints with brush and tar.	Performance.
Nail edges overlapping on sheathing.	Observe and assist	Hammer Nails	Nail overlapping edges and trim. Assignment: Update continuing assignment of listing and defining new terms in the notebook.	Sequence quiz on steps in applying roll roofing. Check notebooks.

TASK NO. 27: APPLYING SHEET METAL ROOFING TO A BUILDING

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading a blueprint to determine the side and end laps of roofing. Determining what nails to use and placement of nails on sheet by manufacturer.	Discuss advantages and disadvantages of tin or metal roofing. Review methods of applying various metal roofs.	Text: Practical Carpentry, pp. 200-201. Lead headed and galvanized nails.	Reading package instructions, blueprints, and text on metal roofing.	Oral and written test on key words.
Squaring and cutting metal with tin snips or hacksaw.	Demonstration of proper use of tools.	Hacksaw Tinsnips Framing Square Scriber or Awl	Squaring and cutting sheet metal with proper tools.	Performance.
Nailing sheets to roof with specified nails.	Direct students in application of roofing.	Nails Hammer	Nailing sheet metal to roof.	Performance.
Observing safety in handling and working on roof with tin.	List of precautions to observe.	Chalkboard	Observing safety rules in roof work.	Oral or written test on various types of roofing.

TASK NO. 28: APPLYING BUILT-UP ROOFING TO A BUILDING

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading a blueprint to determine the number of piles and type of materials to be used according to manufacturers directions and instructions.	Discussion and review of various types of built up roofs. Film	Blueprints Text: Practical Carpentry, pp. 187-188. Instructions (Packing) "My Father's House," U.S. Gypsum Co., 300 W. Adams St., Chicago, Illinois. 30 minutes.	Review blueprint to determine specifications.	Oral or written questions.
Measuring perimeter of roof to determine area to be covered.	Present problems in finding square footage areas.	Tape Pencil Paper Chalkboard	Practice in measuring and finding amounts of areas.	Test problems on square footage
Cutting and Nailing sheathing paper to roof.	Direct activity.	Sheathing paper Staples or Nails Hammer Knife	Cut and nail paper to roof.	Performance.
Laying succeeding piles of felt and breaking the joints.	Assist students in application.	Felt Paper	Lay felt as directed.	Performance.
Application of asphalt with a brush.	Demonstration of proper use of asphalt brush.	Brush (6 inch) with handle Bucket Asphalt	Apply asphalt with brush.	Performance.
Covering last coat of asphalt with gravel or crushed stone.	Direct activities	Shovel Rake Stiff Broom	Cover last coat of asphalt with gravel or stone.	Performance.
Cleaning tools after use.	Discuss safety procedures Protection of body and clothing.	Solvent Bucket	Cleaning tools after use.	Inspection of tools.

TASK NO. 29: INSTALLING A HANGING GUTTER TO A ROOF.

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading a blueprint to determine the direction of water flow and the location of downspouts. Reading manufacturers specifications.	Outline reasons for and uses of gutters and downspouts. Discuss manufacturer's specifications.	Practical Carpentry Text, page 202-203. Packing instructions.	Reading blueprints to determine location of gutters. Studying text to become familiar with the uses of gutters. Reading packing instructions.	Oral or written question period
Measuring to locate hangers to an accuracy of 1/16 of an inch.	Work with group to locate marks	Tape or Rule	Measure and locate proper spacing for hangers	Observation
Nailing hangers into place under shingles 1/16 of an inch.	Assist and observe group	Roofing Nails Hangers Hammer	Nail hangers into place under shingles	Performance
Raising gutter into place with aid of ladder.	Demonstrate proper use of ladder, handling of gutter material.	Ladder Section of Gutter Level	Raise gutters into place.	Performance
Nailing gutters into place 1/16 of an inch.	Direct activity aid if necessary	Hammer Gutter Nails	Nail gutters into place	Performance
Fastening gutters with hooks	Demonstrate to group		Fasten gutters with hooks	Performance
Fastening downspout brackets to siding of house to accuracy of 1/8 of an inch.	Assist Groups	Downspout Brackets Screws Screwdriver	Fasten downspout brackets to house siding.	Performance
Securing downspout sections.	Assist Group	Section of downspout.	Securing downspout sections.	Performance
			Assignment: Written report on the different kinds of gutters.	Evaluate Student Reports

TASK NO. 30: FASTENING WOOD TO MASONRY WITH TOGGLE BOLTS, LEAD SHIELDS, PLASTIC, WOOD PLUGS.

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading packing instructions to determine proper hole sizes for fasteners to be used.	Review instructions with group.	Packing Instructions Fundamentals of Carpentry, pp. 198-202.	Review Packing Instructions	Oral Test on Instructions
Reading blueprint to determine location of each fastener.	Review blueprints to spot locations of firring, etc.	Blueprints	Review Blueprints	Oral Questioning
Measuring to find location of fasteners within 1/16 of an inch by finding center points on walls and ceilings.	Instruction and demonstration on locating center points.	Tape Rule Chalkline	Practice measuring to find center points and divisions of equally spaced fastener locations	Observe performance
Drilling holes to fasten and attach wood or other material.	Assist and give directions to group. Demonstrate if necessary.	Drill Bits (Wood and Masonry) Electric Drill	Using scrap material first then actual material for drilling	Performance
Drilling holes with star drill and hammer.	Demonstrate safety goggles. Advise.	Star Drill 24 oz. Hammer	Practice drilling holes in concrete, cinder blocks, bricks, plaster with star drill and hammer	Performance
Driving various fasteners with impact tool.	Demonstration Observe group practice	Impact Fastener Kit	Practice in driving impact fasteners	Performance
Attaching wood to masonry with screwdriver or wrench.	Assist group procedure Demonstration in use of tools.	Adjustable wrench Screwdriver	Attach wood to masonry with screwdriver or wrench.	Performance
Restoring drill tools to usable tools.	Demonstrate sharpening procedure.	Bench Grinder Files Stone	Practice grinding tools on bench grinder	Performance

TASK NO. 31: INSTALLING INSULATION AND VAPOR BARRIERS (BLANKET, BULK, RIGID AND METALLIC) TO A HOUSE.

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading packing instructions for proper application.	Review instructions with group.	Packing instructions. Textbook, Practical Carpentry," pp. 207-236	Read packing instructions	Written or oral questions.
Measuring area to determine amount of insulation to obtain.	Direct practice on square footage problems.	Chalkboard Tape or Rule	Practice measuring areas for square footage.	Problems on chalkboard
Cutting insulation to length with saw or knife to an accuracy of 1/8 of an inch.	Assist and observe groups	Jam Knife	Cut insulation to proper length using jig pattern.	Observation
Using pattern to cut multiple pieces same size.			Nailing rigid insulation into place.	Performance.
Nailing rigid insulation to joists or rafters.	Demonstration	Flat Headed Nails Hammer Stapler Roll Insulation	Assignment: Written report on various types of insulation.	Evaluate student report.
Pouring fill insulation between joists by hand.	Demonstration on amount and method.	Loose Insulation	Pour fill insulation into place.	Observe.
Nailing or stapling reflective insulation to framing allowing air space of 3/4 inch.	Demonstration	Roll of reflective insulation Nails Hammer Stapler	Nail reflective insulation to framing.	Performance
Sealing ends of blanket insulation with staples when installing.	Assist and direct group. Film	Blanket Insulation Stapler "The Story of Rock-Wool Home Insulation," U. S. Bureau of Mines, 4800 Forbes St., Pittsburg, Pa. "Within These Walls," U.S. Gypsum Co., 300 W. Adams St., Chicago, Ill.	Seal ends of blanket insulation.	Performance. Procedure test on steps involved in installing insulation and vapor barriers.

TASK NO. 32: INSTALLING BACKING TO INTERIOR WALL

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading blueprints to determine location of fixtures, wall partitions, etc.	Lecture	Text: Practical Carpentry, pp. 295-297.	Read and review blueprints. Study text, pp. 295-297.	Oral and written questions.
Measuring for placement of back-up blocks	Demonstration Assist Group	Rule Tape	Measure for placement of blocks.	Observation
Measuring blocks for placement at various locations and cutting blocks.	Direct Group	Rule Square Hand Saw Electric Saw	Measure blocks for various placement.	Observation
	Film	"How To Finish Plywood," 22 min., color, Douglas Fir Plywood Association, Tacoma Building, Tacoma, Washington	Viewing film.	Discussion of film.
Nailing blocks into place within 1/16 of an inch.	Direct Group	16D Nails 8D Nails Hammer	Nail blocks into place. Assignment: written report on interior wall finishes.	Evaluate student performance in installing backing to interior wall. Evaluate student reports

TASK NO. 33: APPLYING COMMERCIAL WALLBOARD TO THE INTERIOR OF A BUILDING

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading blueprints to determine thickness of board, location, and method of application.	Review Text Practical Carpentry, pp. 295-307.	Text. Blueprints Advertising Folders from Dry Wall Companies.	Review blueprints. Read Text.	Oral or written questions.
Measuring sheets for length, width, and openings such as windows, door, electrical outlets and plumbing fixtures 1/16 of an inch.	Demonstrate how to economically cut pieces to fit in certain areas.	Tape Chalkline Straightedge Rule	Measure and mark full sheets for windows, doors, electrical and plumbing outlets.	Observation
Squaring cuts with framing square to 1/16 of an inch.	Assist Group	Framing Square Rule	Cut wall board to size with knife or saw.	Observation
Cutting wallboard to size and cutting outlets for electrical and plumbing fixtures.	Discuss care in cutting neatly	Knife Saw Square Rule		
Placing cut sheets into place lining up with framing members.	Discuss care in handling material aids or props used.	4 X 8 Sheets of Sheetrock Props Scaffolds Saw Horses	Placing and nailing.cut sheets with framing members.	Evaluate student performance in applying commercial wallboard to the interior of a building.
Nailing wallboard into place from center out.	Demonstrate how to drive nails into material. Set with hammer head.	Sheetrock Nails Hammer		
Locating framing members by sounding or measuring so sheets can be nailed into them.	Demonstrate tapping or sounding method, measuring method.	Hammer Tape or Rule		

TASK NO. 34: INSTALLING FURRING AND GROUNDS TO INTERIOR OF A BUILDING.

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading a blueprint to determine center to center distance of furring or location of the grounds.	Explain reasons grounds are necessary	Text. PP. 331-332.	Read blueprints and note where center distances are. Read Text.	Oral or written questions Performance.
Laying out location of ground to accuracy of 1/8 of an inch.	Assist group in measuring correctly	Tape Rule	Layout and mark location of grounds	Performance
Sounding with a hammer to locate studs.	Demonstrate to class.	Hammer	Locate studs by sounding or measuring.	Performance.
Squaring cuts with a framing square to an accuracy of 1/8 of an inch.	Reveiw use of framing square.	framing square	Square cuts with framing square.	Performance.
Cutting furring or grounds to length with a hand crosscut or power saw.	Demonstrate safe uses of hand and power saws.	Hand Saw Power Saw	Cut furring or grounds to length with hand saw or power saw.	Evaluate student performance
Nailing strips in place to an accuracy of 1/8 of an inch.	Assist group in proper procedure.	Hammer 8D Common Nails	Nail strips in place.	Evaluate Performance
Marking stud locations on the floor with chalk for later identification.	Observe procedure	Chalk or lumber crayon	Mark stud locations on floor with chalk for later identity.	Evaluate Performance
	Film	"Interior and Exterior Trim," USN/United World Films, 1445 Park Avenue, New York	Viewing film.	Discussion of film.

TASK NO. 35: APPLYING LATH TO STUDDING

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading a blueprint to determine type location of lath.	Text study and review.	Text: Practical Carpentry, pp. 295-298.	Review blueprints and read text lesson.	Have students provide information missing from an incomplete blueprint.
Constructing scaffold using saw horses and planks	Review saw horse construction, Task 2	Saw Horses Scaffold Boards	Use saw horses and planks to form scaffold - set up scaffold.	Evaluate student performance in applying lath to studding.
Measuring squaring and cutting gypsum lath to an accuracy of 1/8 of an inch.	Assist group in proper handling of lath.	Saw Knife Square	Measure square and cut lath.	Observation
Cutting wood lath with knife, hatchet, saw to 1/8 of an inch.	Demonstrate safe handling of tools.	Knife Hatchet Saw	Cut wood lath with knife hatchet or saw	Observation
Nailing lath to studs.	Demonstrate nail spacing	Hammer Lath Nails	Nail lath to studs.	Observation
Cutting and nailing metal lath to studs	Demonstration	Tin Snips Hammer Nails	Cut and nail metal lath to studs.	Observation
Nailing corner beads to lath at corners.	Direct group activity	Tin Snips Hammer Nails	Nail corner beads to lath at corners. Run a strength or holding test on the various kinds of lath used on walls and make a written report.	Observation Evaluate report.

TASK NO. 36: APPLYING CORNER BOARDS TO A HOUSE

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading blueprints to determine type of corner board.	Supervised study of blueprints and text.	Text, Practical Carpentry, pp. 130-134.	Review Blueprints. Read Text.	Have students sketch a section drawing of an exterior wall and its components.
Placing boards on corner to determine shape of top portion.	Demonstrate and assist group.	3/4 X 4 Pine Boards	Place corner boards on corner to determine shape of top portion. Mark to cut.	Evaluate student performance in applying corner boards to a house.
Cutting boards to length to ac. of 1/16 of an inch.	Demonstration	Hand Saw Power Saw Square	Cut boards to length.	Evaluate student performance in applying corner boards to a house.
Nailing boards to form angle to ac. of 1/32 of an inch.	Direct group activity	Hammer 6D Finishing Nails	Nail boards together to form corner angle.	Evaluate student performance in applying corner boards to a house.
Nailing corner boards to siding or sheathing ac. of 1/16 of an inch.	Direct and assist group	Alum. Nails 8D Hammer	Nail corner boards to siding or sheathing.	

TASK NO. 37: ASSEMBLING BASEMENT STAIRS FOR A HOUSE

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading blueprint to determine location of the stairs.	Supervised study of blueprints and text.	Text: Practical Carpentry, pp. 283-289. Blueprints	Review blueprints and read text on stair building.	Sketch landing arrangements for 9 and 10 inch treads with varying ceiling heights.
	Film	"Fundamentals of Stair Layout," USN/ United World Films, 1445 Park Ave., New York.	Viewing film.	Discussion of film.
Attaching sole plate to basement floor ac. of 1/16 of an inch.	Demonstrate use of case hard nails or impact gun. Also concrete anchors.	2 X 8 Sole Plate Impact Tool Kit 8D Case Hard Nails	Attach sole plate to basement floor with hammer or impact tool set.	Evaluate student performance
Erecting precut stringers into place ac. 1/16 of an inch.	Direct and assist group	16D Nails Hammer Level Square	Erect stringers into place. Hold to marks on joist headers. Nail in Place.	Evaluate student performance.
Nailing treads to stringers ac. 1/16 of an inch.	Direct and assist groups	16D Finishing Nails Hammer Nail Set	Nail treads to stringers.	Observation
Nailing risers to stringers ac. of 1/16 of an inch.		8D Finishing Nails Hammer	Nail users to stringers.	Observation
Laying out stair treads and risers	Review math and present stair riser and tread problems.	Chalkboard Practical Carpentry, pp. 283-289	Practice laying out stair stringers. Study the parts of a staircase. Solve stair riser and tread problems.	Written test and stair riser and tread problem test.

TASK NO. 38: ERECTING ROOF AND DECK FRAMING FOR A PORCH

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading a blueprint to determine the type of construction and spacing members.	Review of text and blueprints with group.	Practical Carpentry, pp. 99-124.	Review blueprints. Read text, pp. 99-124.	Sketch types of roofs.
Locating the center holes in plate to an accuracy of 1/16 of an inch.	Supervise measuring and marking.	Tape Folding Rule Framing Square	Using rule or tape to locate center holes in plate.	Evaluate Student performance in erecting roof and deck framing for a porch.
Drilling holes in plate.	Assist and observe group	Brace and Bit Electric Drill	Drilling holes in plate with hand drill or electric drill.	Evaluate student performance in erecting roof and deck framing for a porch.
Securing plate to masonry with accuracy of 1/16 of an inch.	Assist and observe group	Adjustable Wrench	Secure plate to masonry with adjustable wrench.	Evaluate student performance in erecting roof and deck framing for a porch.
Leveling sill and plate members with a level.	Observe group for accuracy	Level	Using a level to level sill and plate members.	Evaluate student performance.
Nailing the frame together - accuracy 1/16 of an inch.	Observe group for accuracy	Hammer 16D Nails	Use 16 oz. hammer to nail the frame together.	Evaluate student performance.
Erecting scaffolding to reach roof members.	Refer to text on scaffold building.	Textbook, p. 371.	Build a scaffold to reach roof members.	Evaluate student performance.
Erecting corner posts with a level and hammer to accuracy of 1/16 of an inch.	Demonstrate and assist group.	Textbook, p. 81.	Erect corner posts and level or plumb before bracing and nailing. Write report and sketch roof types.	Evaluate student performance. Evaluate written report to accompany sketches of roof types.

TASK NO. 39: LAYING PORCH FLOORS FOR A HOUSE

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Measuring, marking and cutting boards to the accuracy of 1/16 of an inch.	Review of plans for type of material to be used.	Teacher made handout on porch floors. Tape Rule Framing Square Hand Saw Portable Saw	Measure mark and cut floor boards to length.	Evaluate student performance in laying porch floors for a house.
Driving Tongue and Groove flooring up tight with scrap piece of flooring and hammer on pry bar.	Demonstration and observe group.	Scrap Flooring Hammer Pry Bar	Drive tongue and groove flooring up tight with hammer and scrap piece of flooring.	Evaluate student performance.
Nailing floor to joist.	Assist group	Hammer Nails	Nail floor boards to joists.	Evaluate student performance.
Setting Nails	Assist Group	Nail Set Hammer	Set nails with nail set. Assignment: (Culmination of the two continuous assignments) Write answers to carpentry questions, pp. 286-290, Carpentry for the Building Trades.	Evaluate student performance. Evaluate answers in notebooks.

OCCUPATIONAL INFORMATION UNIT FOR CARPENTRY

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
The employment outlook: 1. Local 2. National	Lecture.	Publication: Occupational Outlook Report Series, Bulletin #1450, 1966-67 edition, Occupational Outlook Handbook, Department of Labor, Government Printing Office, Washington, D.C., p. 9. Teacher-developed occupational information.	Visiting local construction sites to determine outlook for carpentry jobs.	Oral questions. Review students' notes on field trip. Written questions.
The wage scales: 1. Local a. union (1) apprentice (2) journeyman (3) master b. non-union (1) entry wage (2) experienced 2. National a. union (1) apprentice (2) journeyman (3) master b. non-union (1) entry wage (2) experienced	Lecture. Chalkboard. Overhead projector.	Teacher-made visuals showing union and non-union wage scales. Overhead projector. Teacher-developed occupational information. Publication: Occupational Outlook Report Series, Bulletin #1450-14, 1966-67 edition, Occupational Outlook Handbook, Department of Labor, Government Printing Office, Washington, D.C., p. 10.	Inquiring from local builders for information on wages for carpenters. Calling or writing union officials and getting information on wages. Developing a table showing the union and non-union wage scale.	Reviewing the information received from the local builders and union officials. Checking student notebooks for information on union and non-union wage scale.
Types of training available: 1. Apprenticeship 2. Technical, trade or high school program 3. On-the-job 4. Military	Lecture. Field trip to a training school.	Chalkboard. Brochures from apprenticeship or trade school courses.	Giving reports on various programs of training.	Written test on types of training available. Review reports of students on results of field trip to the training schools.
Working conditions experienced in	Lecture.	Publication: Occupational Outlook Government Printing Office, Washington, D.C. Chalkboard. Teacher-made charts and visuals.	Writing a unit for the notebook on	Checking the student notebook.

OCCUPATIONAL INFORMATION UNIT FOR CARPENTRY (continued)

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Physical and mental characteristics.	Lecture.	Chalkboard. Visual charts showing important physical and mental requirements. Publication: Job Guide for Young Workers, 1963-64 edition, Government Printing Office, Washington, D.C., p. 48.	Reading assignment: Job Guide for Young Workers. Entering the most important information from the reading assignment in the student notebook.	Checking the student notebook.
Geographical location of employment.	Lecture.	An assortment of classified ads from a variety of daily newspapers.	Making a bulletin board display from classified ads of help wanted: carpenters. Making a list of types of construction sites where carpenters would be employed.	Checking student lists of job sites where carpenters are employed.
Opportunities for advancement.	Lecture. Visiting experts from the trade.	Chalkboard. Publication: Guide for Young Workers, 1963-64 edition, Government Printing Office, Washington, D.C., p. 48. Occupational Outlook Report Series, Bulletin #1450-14, 1966-67 edition, Government Printing Office, Washington, D.C., p. 9.	Making a list of opportunities for advancement for the notebook.	Reviewing work in the student notebook.
Advantages and disadvantages of the occupation.	Lecture.	Teacher-made charts, visuals and chalkboard. Overhead projector. Publication: Occupational Outlook Report Series, Bulletin #1450-14, Occupational Outlook Handbook, Government Printing Office, Washington, D.C., pp. 8-9.	Developing a chart showing the advantages and disadvantages of the occupation for the student notebook.	Testing the student on opportunities for advancement and advantages and disadvantages of the occupation.
Nature of work involved in the occupation.	Lecture. Guest speaker.	Publication: Occupational Outlook Report Series, Bulletin #1450-14, Occupational Outlook Handbook, Government Printing Office, Washington, D.C., p. 8.	Interviewing a tradesman to determine the nature of his work.	Reviewing the reports of students' interviews.

OCCUPATIONAL INFORMATION UNIT FOR CARPENTRY (continued)

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Union involvement in the occupation.	Lecture. Guest speaker - union official or member.	Union material such as pamphlets and organizing material from local or national office.	Making a list of the ways the union is involved in the occupation and of the benefit offered the worker.	Checking the student notebook.
Means of entry into the occupation.	Lecture. List various means. Visiting officials from trade school, union, or building firm.	Publication: Occupational Outlook Report Series, Bulletin #1450-14, Occupational Outlook Handbook, Department of Labor, Government Printing Office, Washington, D.C., p. 9.	Interviewing several tradesmen to determine how they gained entry to the occupation. Writing reports of these interviews.	Reviewing students' reports of interviews. Giving an overall test of knowledge of the occupational unit.

ELECTRICITY

TASK NO. 1: INSTALLING BOXES FOR RECEPTACLES, SWITCHES, JUNCTIONS AND FIXTURES IN A HOUSE.

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading a blueprint to determine the location of boxes. Reading the code to determine regulations concerning placement and sizes of boxes.	Lecture. Demonstration.	House blueprint. Electrical symbol guide sheet. Assignment sheet. National Electrical Code Handbook. Assignment Sheet in Code, p. 291-303.	Identifying symbols and reading construction blueprints.	Test sheet on identification of electrical symbols.
Explaining different types, sizes and methods of fastening boxes to the old and new construction.	Lecture. Demonstration.	Side bracket box. Octogon box (different sizes). Outlet box (different sizes). Grip tight box clamps. Ceiling Hangers. Rectangular Boxes (different sizes). Wiring Simplified, H. P. Richter, p. 93-101, p. 56-61.	Individual and group participation in reading and studying code handbook. Marking location of boxes on or near studs to an accuracy of 1/16 of an inch. Individual and group participation in the actual fastening of various type boxes.	Assignment Sheet. Observation. Identification sheet on types of boxes. Observation of student activities.
Measuring the wall to locate boxes with a ruler to an accuracy of 1/16 of an inch. Squaring blocking with a framing square to an accuracy of 1/16 of an inch. Explaining the purpose of grounding portable electric tools. Explaining need for added care with electrical tools when in contact with the ground. Protecting oneself by wearing safety glasses. Explaining safe use of an electric saw. Cutting blocking to proper length with a handsaw or power saw in order to install boxes between framing members to an accuracy of 1/16 of an inch. Installing blocking between framing members with a hammer to an accuracy of 1/16 of an inch. Removing bent nails with a bar or hammer.	Lecture. Demonstration.	Tape. Rule. 6' Folding Rule. Framing Square. Extension Cord, 3 Wire. 3 Prong Adapter Plug. Hand Saw. Portable Electric Saw. Radial Arm Saw. Table Saw. Claw Hammer. 8D, 16D Common Nails. 2 X 4 Blocking. Leverage Block. Ripping Bar. Ripping Chisel. Pencil. Firring Strip. Saw Horses.	Measuring sample pieces of stock and recording measurements on a data sheet. Laying out line for lengths of blocking specified. Making ground connections properly. Cutting blocking with hand saws and power saws to an accuracy of 1/16 of an inch. Nailing blocking in place to an accuracy of 1/16 of an inch. Removing nails with a ripping chisel or with a hammer and a leverage block.	Checking data sheet for correct responses. Checking accuracy of layout to 1/16 of an inch. Observation. Checking accuracy of blocking cut by students. Checking accuracy of students' work.

Task No. 1 (continued)

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Explaining safe use of a screwdriver. Explaining safe use of an electric drill. Explaining importance of the "code." Installing boxes with a hammer or screwdriver at proper location on framing members allowing for proper projection for various sheathing materials to an accuracy of 1/16 of an inch. Removing knock-out plugs only when necessary. Explaining safe use of a step ladder. Installing boxes between framing members with a proper projection for various sheathing materials with a screwdriver to an accuracy of 1/16 of an inch. Joining boxes together for multiple outlets with a screwdriver. Locating the center of a room with a chalkline.	Lecture. Demonstration.	Screwdriver. Electric Drill. Extension Cord. Assorted Outlet Boxes and Junction Boxes. Claw Hammer. 6' Folding Ruler. Tape Rule. 1" #6 Pan Head Screws. Chalkline and Chalk. Drill Set. Step Ladder. Assorted Pieces of Sheathing Materials. National Electrical Code Handbook, p. 291-303. Wiring Simplified, H. P. Richter, pp. 93-101, pp. 58-61.	Fastening outlet boxes to framing members and between framing members at the proper location and with correct projection to an accuracy of 1/16 of an inch. Joining boxes together for multiple outlets.	Observation. Testing for knowledge of accepted methods of using and installing electrical boxes.
Installing boxes on a masonry wall with an electric drill and screwdriver to an accuracy of 1/8 of an inch. Installing boxes on masonry wall with an impact tool.	Lecture. Demonstration.	Masonry Bits. Lead or Plastic Anchors. Toggle Bolts. Electric Drill. Screwdriver. Impact Tool and Fasteners. Outlet Boxes.	Fastening outlet boxes on a masonry wall to an accuracy of 1/8 of an inch.	Test sheet on identification of various types of masonry fastening devices. Observation.

TASK NO. 2: INSTALLING WIRING FROM BOX TO BOX IN A HOUSE.

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Read a blueprint to determine size of wire required. Reading "code" to determine size of wire required.	Lecture. Home Assignment.	House Blueprint showing wiring. National Electrical Code Handbook, H.P. Richter pp. 172-245, pp. 19-25.	Identifying gauges of wire by size on data sheet. Home assignment in National Code Handbook. Develop a table for notebook showing current capacities of various gauges of wire.	Check student data sheets. Test on current capacities of various gauges of wire.
Explaining importance of grounding electric tools. Measuring length of running boards with a ruler to an accuracy of 1/8 of an inch. Explaining safe use of an electric saw. Explaining need for added care in electrical work when in contact with the ground. Protecting oneself by wearing safety glasses, helmets and gloves. Squaring running boards with a framing square to an accuracy of 1/8 of an inch. Cutting running boards to size with a hand saw or power saw to an accuracy of 1/8 of an inch. Explaining safe use of a step ladder. Installing running boards on framing members, with a hammer, for running wire or cable. Removing bent nails with a bar or hammer.	Lecture. Demonstration.	6' Folding Rule. Tape Rule. Framing Square. Crosscut saw. Radial Saw. Portable Electric Saw. Claw Hammer. 8D Common Nails. Step Ladder. Extension Cord with Adapter Plug. 1 X 3 Stock for Running Boards. Saw Horses. Ripping Bar. Chisel. Leverage Block. Wiring Simplified, H. P. Richter, p. 60.	Laying out given lengths and squaring running boards to an accuracy of 1/8 of an inch. Cutting running boards to an accuracy of 1/8 of an inch. Installing running boards. Removing bent nails.	Observation. Checking accuracy of student work. Test on safe use of power saws.

Task No. 2 (continued)

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Explaining importance of the "code." Explaining safe use of a screwdriver. Explaining safe use of an electric drill. Drilling holes in framing members with an electric drill for running wire. Cutting wire with side cutters. Running wire from box to box. Protecting cable insulation from damage by bending or kinking. Fastening wire to framing members with staples and hammer. Removing protective sheathing with a cable stripper. Removing knock-out plugs with a screwdriver. Removing knock-out plugs only when necessary. Fastening wire to box with cable connectors and screwdriver. Running wire from box to box with no s splices in between. Protecting cable from nails used in construction.	Lecture. Demonstration.	National Electrical Code Handbook, pp. 172-245. Electric Drill. 3/4 or 7/8 Wood Bit. Extension Cord. Side Cutters. Non-Metallic Sheathed Cable. Claw Hammer. Staples. Cable Stripper. Octagon box. Step Ladder. Metal Plates. Wiring Simplified, H. P. Richter, pp. 64-65, p. 58.	Drilling holes in framing members in proper location for running wire. Running wire from box to box being careful to protect it from damage. Fastening wires to framing members with staples in accordance with the code. Removing knock-out plugs and installing cable connectors with proper attachment of grounding wire. Installing junction boxes where splices are necessary. Making an information sheet for the notebook listing rules for proper installation of wire from box to box.	Observing student work. Checking student notebooks. Test on rules for proper installation of wire from box to box.
Installing wire in conduit with a fish tape.	Lecture. Demonstration.	Wire. Fish Wire. Side Cutters. Wiring Simplified, H. P. Richter, pp. 77-78.	Installing wire in conduit in accordance with the code.	Observing student work.

TASK NO. 3: CONNECTING RECEPTACLES, SINGLE THROW SWITCHES, FIXTURES AND PILOT LIGHTS TO COMPLETE CIRCUITS IN A HOUSE

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading a blueprint to determine location of switches, receptacles, fixtures and pilot lights. Reading the "code" to determine acceptable practice for installation.	Lecture.	Blueprint showing symbols for switches, receptacles, fixtures and pilot lights. National Electrical Code Handbook, pp. 310-311. Overhead Projector. Visuals showing electrical symbols.	Constructing a table of electrical symbols for the notebook. Reading an assignment in the code book.	Checking the student notebooks. Testing the student on acceptable practice as set forth in the National Electrical Code Handbook.
Cutting wire to length with side cutters Removing inner insulation from wire with a knife. Fastening wire under terminal screw with a screwdriver. Fastening ground wire to receptacle, box or connector with a screwdriver. Installing receptacles or switches in outlet boxes in a plumb or level position with a screwdriver. Installing switch or receptacle plates with a screwdriver. Explaining the importance of "code." Explaining the safe use of a screwdriver.	Lecture. Demonstration.	Wiring Simplified, H. P. Richter, pp. 37-42. Side Cutters. Knife. Screwdriver. Round-Nose Pliers. Receptacle. Switch. Pilot Light. Switch and Receptacle Plates. Overhead Projector. Visuals showing proper removal of insulation, placing wire under the terminal screw, and fastening ground wire to cable clamp.	Cutting wire to correct length, removing insulation, fastening ground wire and conductor in proper places. Attaching receptacle and switch plates.	Observation and inspection of completed work.
Explaining safe use of a step ladder. Splicing wire with a pigtail splice using side cutters. Splicing wires with a wire nut. Scraping wire with a knife prior to soldering. Soldering a splice with a flame or electric soldering gun. Insulating a splice with electrical tape. Using various sorts of heat for soldering. Using and storing LP soldering equipment with care. Using safety precautions around hot materials. Protecting oneself by wearing safety glasses.	Lecture. Demonstration.	Wire Nuts. Cable. Knife. Flux. Soldering Gun. Bernzo-Matic Torch. Electricians Tape. Safety Glasses. Rosin Core Solder. National Electrical Code Handbook, pp. 22-23. Wiring Simplified, H.P. Richter, pp. 25-29.	Splicing wires with a wire nut or with side cutters. Soldering scraped and unscraped wires to see the necessity of cleanliness. Insulating splices with electrical tape. Explaining the need for fluxing action. Protecting l.p. soldering equipment from oil.	Observation and inspection of student work.

Task No. 3 (continued)

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Hanging fixtures from a box with 1/8 inch pipe. Connecting fixtures to a box by means of a strap. Cleaning up any dirt in area where work is finished.	Lecture. Demonstration.	Fixture. Threaded Pipe. Strap. Ceiling mounted outlet box with a piece of finished ceiling material surrounding outlet box. Wiring Simplified, H.P. Richter, p. 92. Electric Wiring, Sears Roebuck & Co., p. 36.	Installing ceiling and wall fixtures using straps. Cleaning up the work area.	Observation. Testing the student on connecting wires to receptacles, splicing and soldering including safety procedures and code requirements.

TASK NO. 4: ERECTING A TEMPORARY SERVICE POLE FOR PORTABLE ELECTRICAL EQUIPMENT USED IN A BUILDING.

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading code to determine proper 'lation. Explaining importance of "code."	Lecture.	Overhead Projector. Overlay showing basic requirements for temporary service installation. National Electrical Code Handbook, pp. 65-74.	Reading code requirements for temporary service installation and listing important points in a notebook.	Short test on temporary service installation. Check student notebook.
Digging a hole with a bar and shovel. Erecting the service pole in the hole. Filling the hole surrounding the pole with earth using a shovel. Tamping the earth around the pole with a bar. Protecting oneself by wearing: a. Safety Glasses b. Safety Shoes c. Safety Helmets d. Gloves	Demonstration.	Pole. Shovel. Bar. 4" Level. Post Hole Digger.	Group participation in digging a post hole and wearing appropriate safety apparel.	Observation.
Measuring lumber with a ruler to an accuracy of 1/8 of an inch. Cutting stakes with a hand saw. Sharpening stakes with an axe. Driving stakes with a sledge hammer. Installing braces from stakes to pole with a hammer.	Lecture. Demonstration.	1 X 3 Lumber. Hand Cross-Cut Saw. Axe. Sledge Hammer. 8D Common Nails. Claw Hammer. 4' Level. 6' Folding Rule or Tape Rule.	Plumbing and bracing a pole. Cutting, sharpening and driving stakes.	Observation.
Fastening board to pole with a hammer for securing meter and fuse panel. Removing bent nails with a bar or hammer. Erecting waterproof covering for meter and fuse panel with a hammer and saw. Explaining safe use of a step ladder.	Demonstration.	Plywood. Tar Paper or other waterproof material. 6' Folding Rule or Tape Rule. Hammer. Ripping Chisel. Roofing Tacks. 8D Nails. Step Ladder. Framing Square.	Constructing a waterproof covering for a meter and fuse panel.	Observation. Test on hole-digging, pole-erection and bracing, "code" requirements for temporary service pole, and safety.

2

TASK NO. 5: INSTALLING RIGID AND THIN WALL CONDUIT FROM BOX TO BOX

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading a blueprint to determine the size of conduit required and location of outlet boxes. Reading a table to determine size of conduit needed for number of wires to be run. Reading "code" regarding installation of conduit.	Lecture.	Wiring Simplified, H. P. Richter, p. 77. National Electrical Code Handbook, pp. 251-256. Blueprint made for a conduit installation.	Filling in a data sheet with information taken from the blueprint. Constructing a table for the notebook showing the size of conduit required for various quantities and gauges of wire. Reading an assignment in the "code" handbook.	Checking the data sheet and table showing the size of conduit. Short test on reading in "code" handbook.
Measuring the length of conduit with a ruler to an accuracy of 1/16 of an inch. Measuring conduit diameter with a ruler to determine size. Adding, subtracting, multiplying, dividing, in order to economically cut stock to correct lengths. Holding conduit in a vise. Using cutting oil for cutting and threading conduit. Cutting conduit to length with a cutter or hacksaw to an accuracy of 1/16 of an inch. Cutting conduit square for proper joints. Reaming the conduit with a reamer. Explaining importance of having a smooth interior in conduit. Cleaning,cutting, reaming and threading tools. Protecting oneself by wearing: a. Safety Glasses b. Safety Shoes c. Safety Helmets d. Gloves.	Lecture. Demonstration. Movie.	Movie Projector. 6' Folding Rule or Tape Rule. Conduit. Pipe Vise. Slotted Wood Block for clamping conduit. In a normal vise. Cutting oil. Pipe Cutter. Hack Saw. Pipe Reamer. Wiping Cloth. Problems listing required lengths of conduit and stock sizes available for cutting them from. Film: "Cutting and Threading Pipe on Power Machines," 16 mm., black and white, 17 min. "Cutting and Threading Pipe By Hand" National Association of Plumbing-Heating-Cooling Contractors, 1016 20th Street, N.W., Washington, D.C. 20036.	Measuring sample pieces of conduit for length and diameter and recroding answers on data sheet. Computing problems that will provide experience in deciding how to cut required lengths of conduit from stock sizes so that a minimum of waste results. Making a wooden block for clamping conduit in a standard vise. Cutting and reaming conduit to required size, to an accuracy of 1/16 of an inch.	Checking data sheet. Checking answers to computation problems. Observation and inspection of student work.
Explaining importance of grounding electric tools. Explaining need for added care in electrical work when in contact with the ground. Threading rigid conduit with a die, by hand or machine. Cutting pipe thread the proper length. Changing die sizes of hand and power thread cutters. Cleaning cutting, reaming, and threading tools with a cloth following use.	Lecture. Demonstration.	Extension Cord. Adapter Plug. Assorted Hand Pipe Dies. Threading Machine. Wiping Cloth. Pipe Vise. Wood Clamping Block. Cutting Oil.	Threading conduit by hand and machine with the thread cut the proper length. Cleaning pipe dies following use. Changing the die sizes on hand and machine thread cutters.	Observing the work of the students noting length of thread cut and the smoothness of cut.

Task No. 5 (continued)

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Bending conduit with a hickey or improvised device. Installing factory made elbows with a wrench. Installing pressure and threaded couplings with a wrench. Installing conduit and fittings with a pipe wrench. Using an adjustable wrench properly.	Lecture. Demonstration.	Overhead Projector. Visuals of factory made conduit fittings. Factory made fittings. 10" Open end adjustable wrench. 10" Pipe Wrench. Conduit. Wiring Simplified, H. P. Richter, pp. 75-78.	Bending conduit to meet specifications of the work sheet. Making an improvised bending device. Installing manufactured fittings on conduit. Reading the assignment in textbooks.	Observing student work.
Explaining the importance of "code." Explaining safe uses of electric drill. Explaining importance of grounding electric tools. Explaining safe use of step ladder Drilling holes for conduit in framing members withaan electric drill. Removing knock-out plugs with a screwdriver. Removing knock-out plugs only when necessary. Connecting conduit to boxes with a wrench. Leveling and plumbing exposed conduit with a level. Explaining safe use of screwdriver. Installing straps on conduit with a screwdriver.	Lecture. Demonstration.	Electric Drill. Extension Cord and Adapter Plug. Step Ladder. 3/4" or 7/8" Drill Bit. Conduit. Conduit Fittings. Boxes. 10" Adjustable Wrench. 10" Pipe Wrench. Screwdriver. 2' Level. Conduit or pipe straps. 1"#6 Pan Head Screws. Wiring Simplified, H. P. Richter, pp. 75-78.	Installing conduit with fittings, boxes and straps. Fastening conduit to masonry and wood surfaces.	Observation. Testing students on cutting, threading, installing and measuring conduit.

TASK NO. 6: INSTALLING SEPARATE CIRCUIT FOR ELECTRIC RANGE

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading a blueprint to determine proper location of range outlet.	Lecture.	Overhead Projector. Visuals showing symbols for range outlet and accepted method of installation. National Electrical Code, Handbook, p. 37-40. Wiring Simplified, H.P. Richter, pp. 85-87.	Reading an assignment in Wiring Simplified, H. P. Richter, p. 85-87.	Short test on reading assignment.
Explaining importance of grounding electric tools. Measuring length of running boards with a ruler to an accuracy of 1/8 of an inch. Explaining safe use of an electric saw. Explaining need for added care in electrical work when in contact with the ground. Protecting oneself by wearing safety glasses, helmets and gloves. Squaring running boards with a framing square to an accuracy of 1/8 of an inch. Cutting running boards to size with a hand saw or power saw to an accuracy of 1/8 of an inch. Explaining safe use of a step ladder. Installing running boards on framing members, with a hammer, for running wire or cable. Removing bent nails with a bar or hammer.	Lecture. Demonstration.	6' Folding Rule. Tape Rule. Framing Square. Crosscut Saw. Radial Saw. Portable Electric Saw. Claw Hammer. 8D Common Nails. Step Ladder. Extension Cord with Adapter Plug. 1 X 3 Stock for Running Boards. Saw Horses. Ripping Bar and Chisel. Leverage Block. Wiring Simplified, H. P. Richter, p. 65.	Laying out given lengths and squaring running boards to an accuracy of 1/8 of an inch. Cutting running boards to an accuracy of 1/8 of an inch. Installing running boards. Removing bent nails.	Observation. Checking accuracy of student work. Test on safe use of power saws.
Explaining importance of "code." Protecting cable from overbending which would damage insulation. Drilling holes with an electric drill for installation of cable. Measuring wall to locate range outlet with a ruler accurate to 1/8 of an inch. Installing cable from fuse panel to outlet leaving sufficient amount for connection. Cutting cable with a hacksaw. Explaining the safe use of a screwdriver. Fastening cable in place with a hammer or screwdriver.	Lecture. Demonstration.	Wiring Simplified, H. P. Richter, pp. 85-90. Electric Drill. Extension Cord and Adapter Plug. 6' Folding Rule or Tape Rule. #6 Cable. Hacksaw. Screwdriver. 1" #8 Pan Head Screws. Claw Hammer. Cable Clamps. Roofing Tacks. Step Ladder. 1 1/2" Wood Bit.	Installing cable from fuse panel to outlet for an electric stove.	Observation of work in terms of acceptability measured by the "code" and specified tolerances of the task.

Task No. 6 (continued)

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Removing outer sheathing from cable with a knife. Removing knock-out plugs with a screwdriver. Removing knock-out plugs only when necessary. Connecting cable to range outlet with a screwdriver. Removing inner insulation from wire with a knife. Connecting cable to terminals with a screwdriver. Fastening range outlet in place with a screwdriver.	Lecture-Demonstration.	Wiring Simplified, H.P. Richter, pp. 85-90. Screwdriver. Range Outlet. 1" #8 Pan Head Screws. Cable Connector. Knife.	Connecting a range outlet to the cable and fastening the range outlet in place.	Observation. Testing the student on procedures for installing a separate circuit for an electric range.

TASK NO. 7: INSTALLING GROUNDS TO MEET CODE REQUIREMENTS FOR A HOUSE

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading a blueprint to determine location of ground. Reading "code" to determine grounding requirements in rural and urban areas.	Lecture. Overhead Projector.	Overhead Projector. Visuals showing ground symbol and differences between urban and rural grounding systems. Wiring Simplified, H.P. Richter, pp. 54-55. National Electrical Code Handbook, pp. 127-168. Blueprint showing a ground.	Drawing examples of acceptable grounding procedures for urban and rural locations to be placed in notebook.	Testing an acceptable grounding procedures. Checking notebook sketches.
Explaining the importance of "code." Explaining the importance of using a ground clamp made of the proper material. Explaining the problem of electrolysis when two unlike metals touch each other. Explaining safe use of a screwdriver. Protecting oneself by wearing safety glasses. Demonstrating safe use of a step ladder. Attaching ground clamp to cold water pipe at proper location with a screwdriver. Connecting ground wire to the clamp with a screwdriver and running back to fuse panel. Attaching ground wire to framing members with a hammer and staples where required. Cutting wire to length with a hack saw.	Lecture. Demonstration.	Assortment of Ground Clamps. Screwdriver. Step Ladder. Ground Wire. Claw Hammer. Staples. Hack Saw.	Connecting up a grounding wire in accordance with the "code."	Observation of student work.
Protecting oneself by wearing gloves. Driving an "artificial ground" or "made electrode" with a sledge hammer for installation of a ground in rural areas.	Lecture. Demonstration.	Pipe for ground, galvanized. 3/4"D X 8' long. Sledge Hammer. Gloves. Step Ladder.	Class participation in driving an artificial ground.	Summary test on principles of proper grounding in urban and rural situations.

TASK NO. 8: INSTALLING ENTRANCE CABLE ON EXTERIOR OF A HOUSE

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading a blueprint to determine proper location. Reading "code" to determine required procedure.	Lecture. Overhead Projector.	Wiring Simplified, H. P. Richter, pp. 43-55. Overhead Projector. Visual showing typical entrance installations. House Blueprint National Electric Code Handbook, Abbott and Stetka, pp. 65-106.	Reading assignment in Wiring Simplified, pp. 43-55. National Electrical Code Handbook, pp. 65-80.	Test on materials for service entrance, location and fixtures used.
Explaining importance of appearance of job. Explaining importance of "code." Explaining safe use of an extension ladder. Measuring wil for location of cable with a ruler to an accuracy of 1/8 of an inch. Locating framing members of house by observation on sounding. Explaining importance of grounding electric tools. Explaining safe use of electric drill. Explaining safe use of screwdriver. Attaching service entrance lead to house with a screwdriver. Removing outer sheathing from end of cable with a knife. Installing entrance cable in entrance head with a screwdriver.	Lecture. Demonstration.	6' Folding Rule or Tape Rule. Electric Drill. Set of Drill Bits. Screwdriver. Side Cutting Pliers. Knife. Extension Ladder. Claw Hammer. Extension Cord and Adapter Plug. Service Entrance Head. 2" #14 R. H. Screws.	Installing an entrance head directly on a house or on conduit provided for that purpose. Stripping insulation from entrance cable and twisting ground wires into a single unit. Following safe practices in use of ladder and tools.	Observation of student work.
Protecting oneself by wearing safety glasses. Protecting cable from damage by over-bending it. Plumbing and leveling the entrance cable. where possible with a level. Fastening cable to side of house with cable clamps electric drill and screwdriver. Bending cable carefully to make a neat installation. Cutting cable with a hacksaw.	Lecture. Demonstration.	2' Level. Cable Clamps. 1 1/2" #10 R. H. Screws. Extension cord and adapter plug. Hacksaw. Screwdriver. Electric Drill. Set of Drill Bits for wood and masonry. Anchors for use with masonry installations.	Fastening cable on several types of construction including masonry and wood with composition sheathing. Class or group activity in making one entrance cable installation.	Summary test including most important point "code" and desirable installation techniques and safety procedures.

TASK NO. 9: INSTALLING LOW VOLTAGE OPERATED BELLS

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading a blueprint to determine location of bells and buzzers. Reading "code" to determine required procedures.	Lecture. Overhead Projector.	Wiring Simplified, H. P. Richter, pp. 79-81 National Electrical Code Handbook, Abbott and Stetka, pp. 612-620. House Blueprints showing low voltage installations. Overhead Projector. Visuals of sumbols and typical installation.	Reading assignment in Wiring Simplified, pp. 79-81. Make a sketch of a typical installation showing symbols for inclusion in notebook.	Short test on svmbols and installation procedure. Check student notebook.
Explaining importance of grounding electric tools. Measuring length of running boards with a ruler to an accuracy of 1/8 of an inch. Explaining safe use of an electric saw. Explaining need for added care in electrical work when in contact with the ground. Protecting oneself by wearing safety glasses, helmets and gloves. Squaring running boards with a framing square to an accuracy of 1/8 of an inch. Cutting running boards to size with a hand saw or power saw to an accuracy of 1/8 of an inch. Explaining safe use of a step ladder. Installing running boards on framing members, with a hammer, for running wire or cable. Removing bent nails with a bar or hammer.	Lecture. Demonstration.	6' Folding Rule. Tape Rule. Framing Square. Crosscut saw. Radial Saw. Portable Electric Saw. Claw Hammer. 8D Common Nails. Step Ladder. Extension Cord with adapter plug. 1 X 3 Stock for running boards. Saw Horses. Ripping Bar and Chisel. Leverage Block. Wiring Simplified, H. P. Richter, p. 65.	Laying out given lengths and squaring running boards to an accuracy of 1/8 of an inch. Cutting running boards to an accuracy of 1/8 of an inch. Installing running boards. Removing bent nails.	Observation. Checking accuracy of student work. Test on safe use of power saw.
Measuring wall for location of bells and buzzers with a ruler to an accuracy of 1/16 of an inch. Explaining safe use of an electric drill. Drilling holes for wire with an electric drill. Running wire from switch to bell and from switch to power source. Cutting wire to length with side cutters. Fastening wire to framing members or running boards with a hammer.	Lecture. Demonstration.	6' Folding Rule or Tape Rule. Electric Drill. 1/2" Wood Bit. Extension Cord with adapter plug. Low Voltage Wire. Side Cutters. Claw Hammer. Small Staples.	Installing wire for low voltage operated bells and buzzers.	Observation of accuracy and use of accepted procedures.

Task No. 9 (continued)

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Explaining purpose of "code." Removing insulation from wire with a knife. Explaining safe use of a screwdriver. Connecting wire to bell or buzzer and switch terminal with a screwdriver. Installing bell or buzzer and switch in place with a screwdriver. Conntecting a transformer to signalling circuit with a screwdriver. Cleaning up after work in any area that has already been finished.	Lecture. Demonstration.	Knife. Screwdriver. 1" #8 pan head screws. Side Cutters. Bell or Buzzer. Transformer. Switch. Broom. Dustpan. Needle Nose Pliers.	Installing bell or buzzer, switch and transformer in order to make the circuit usable. Cleaning up the work area.	Checking the circuit for proper operation. Testing students on fundamental knowledge of circuits for low voltage bells and buzzers.

TASK NO. 10: CONNECTING HOT WATER HEATER TO POWER SOURCE

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading manufacturer's directions for proper installation. Reading "code" to determine acceptable method of installing a water heater. Reading a blueprint to determine location of hot water heater.	Lecture. Demonstration.	Directions for installation. National Electrical Code Handbook, pp. 355-362. House Blueprints. Wiring Simplified, H. P. Richter, pp. 85-90.	Reading manufacturer's directions for the installation of various types and makes of water heaters. Reading sections of code concerning installation of water heaters and various other appliances. Studying blueprints of houses and the location of water heaters keeping in mind most efficient use of supplies, materials, and use of heater.	Check student's ability to follow written instructions in both directions and the code. Check student ability in reading blueprints and locating heaters and various appliances and the proper identification of symbols for each.
Installing a disconnect switch with a screwdriver if the circuit is not protected by a circuit breaker. Measuring the wall with ruler to an accuracy of 1/8 of an inch in order to locate a disconnect switch.	Demonstration.	Wiring Simplified, H.P. Richter, p. 90. Screwdriver. Ruler. Pencil.	Measuring the location of disconnect switch and the proper installation according to local code and written directions furnished with switch.	Check accuracy of measurements to an accuracy of 1/8 of an inch and the proper installation of switch keeping in mind the safe and proper use of all tools involved.
Explaining purpose of grounding electric tools and the safe use of these. Squaring running boards with a framing square to an accuracy of 1/8 of an inch. Cutting running boards to size with a hand saw or power saw to an accuracy of 1/8 of an inch. Explaining safe use of the step ladder. Installing running boards with a hammer for mounting of cable. Removing bent nails with a bar or hammer. Protecting oneself by wearing safety glasses and helmet.	Demonstration. Lecture.	6' Folding Rule. Tape Rule. Framing Square. Crosscut Saw. Radial Saw. Portable Electric Saw. Claw Hammer. 6D Common Nails. Step Ladder. Extension Cord with adapter plug. 1 X 3 Stock for running boards. Saw Horses. Ripping Bar and Chisel. Leverage block. Wiring Simplified, H.P. Richter, p. 65.	Laying out given lengths and squaring running boards to an accuracy of 1/8 of an inch. Cutting running boards to an accuracy of 1/8 of an inch. Installing running boards. Removing bent nails.	Observation. Checking accuracy of student work. Test on safe use of power saws.
Drilling holes with an electric drill for installation of cable. Installing wire from the switch to the water heater. Installing wire from the switch to the fuse panel. Fastening cable in place with a hammer.	Lecture. Demonstration.	Electric Drill. Paddle Bit. Hammer. Staples or Cable Clamps. Plastic or Lead Anchors (if necessary). Masonry Bit (if necessary).	Drill holes in framing members and running cable through these holes. Fastening cable to framing members with staples or cable clamps in accordance with the code.	Check accuracy and safe use of tools while drilling holes. Quiz on proper spacing of staples or cable clamps.

Task No. 10 (continued)

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Removing outer sheathing from cable with a cable stripper. Explaining safe use of the screwdriver. Removing knock-out plugs with a screwdriver. Removing knock-out plugs only when necessary. Installing cable in boxes with connectors and a screwdriver. Cutting cable to proper length with side cutters. Removing inner insulation from wires with a knife. Connecting wires to terminals with a screwdriver. Connecting ground wires to box on cable clamp with a screwdriver. Protecting cable from damage from over-bending.	Lecture. Demonstration.	Cable Stripper. Non-metallic sheathed cable with ground wire. Screwdriver. Side Cutters. Knife.	Connecting cable to outlet box following "code" requirements. Properly grounding the cable to the box.	Observing student work in terms of proper application of "code."
Splicing wires with a pigtail splice using side cutters. Splicing wires with a wire nut. Soldering a splice with a flame or soldering gun. Using various sorts of heat for soldering. Using and storing l.p. soldering equipment with care. Using safety precautions around hot material. Insulating splice with electricians tape. Installing fuses in the disconnect switch.	Lecture. Demonstration.	Side Cutter. Wire Nuts. Bernz-matic Torch. Flux. Rosin Core Solder. Electric Soldering Copper. Electricians Tape. 20 Amp Fuses. Knife.	Comparing soldering of clean and unclean wires. Gaining soldering experience with different heat sources. Splicing and soldering and taping electrical connections.	Observing student work. Testing students on proper soldering practice and safe use of equipment.

TASK NO. 11: CONNECTING A WATER PUMP TO POWER SOURCE

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading a blueprint to determine the location of the pump. Explaining the importance of the code. Reading the "code" to determine required installation. Reading manufacturer's directions for connecting water pump.	Lecture.	Directions for Installation. National Code Handbook, pp. 355-362, previously covered. House Blueprint.	Study blueprints of houses to determine the location of the pump keeping in mind that a city water system may not need a pump and that the location of a well may determine the final selection of the pump location. Reading sections of the code to determine electrical requirements for pumps. Reading and studying manufacturer's directions for the installation of various types and makes of water pumps.	Check student's ability to read and follow directions for installation and code specifications by using a short quiz on procedures and code requirements.
Installing a disconnect swtich with a screwdriver if the circuit is not protected by a circuit breaker. Measuring the wall to locate a disconnect switch with a ruler to an accuracy of 1/8 of an inch.	Demonstration.	Wiring Simplified by H.P. Richter, p. 90. Screwdriver. Ruler. Pencil.	Measuring the location of disconnect switch and the proper installation according to local code and written directions furnished with switch.	Check accuracy of measurements to an accuracy of 1/8 of an inch and the proper installation of switch keeping in mind the safe and proper use of all tools involved.
Explaining purpose of grounding electric tools and the safe use of these. Squaring running boards with a framing square to an accuracy of 1/8 of an inch. Cutting running boards to size with a hand saw or power saw to an accuracy of 1/8 of an inch. Explaining safe use of the step ladder. Installing running boards with a hammer for mounting a cable. Removing bent nails with a bar or hammer. Protecting oneself by wearing safety glasses and helmets. Cutting cable to proper length with side cutters. Installing wire from switch to fuse panel. Installing wire from switch to water pump. Fastening wire to framing members with staples and hammer. Protecting cable from overbending.	Lecture. Demonstration.	6' Folding Rule. Tape Rule. Framing Square. Crosscut Saw. Radial Saw. Portable Electric Saw. Claw Hammer. 8D Common Nails. Step Ladder. Extension Cord with adapter plug. Side Cutters. Non-metallic Sheathed Cable. Claw Hammer. Staples.	Laying out given lengths and squaring running boards to an accuracy of 1/8 of an inch. Cutting running boards to an accuracy of 1/8 of an inch. Installing running boards Removing bent nails.	Observation. Checking accuracy of student work. Test on safe use of power saws.

Task No. 11 (continued)

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Removing outer sheathing from cable with a cable stripper. Explaining safe use of the screwdriver. Removing knock-out plugs with a screwdriver. Removing knock-out plugs only when necessary. Installing cable in boxes with connectors and a screwdriver. Removing inner insulation from wires with a knife. Connecting wires to terminals with a screwdriver. Connecting ground wires to box or cable clamp with a screwdriver.	Lecture. Demonstration.	Cable Stripper. Non-Metallic Sheathed Cable with ground wires. Screwdriver. Side Cutters. Knife.	Drill holes in framing members and running cable through these holes. Fastening cable to framing members with staples or cable clamps in accordance with the code. Connecting cable to outlet box following "code" requirements. Properly grounding the cable to the box.	Check accuracy and safe use of tools while drilling hole. Quiz on proper spacing of staples or cable clamps. Observing student work in terms of proper application of "code."
Splicing wires with a pigtail splice using side cutters. Splicing wires with a wire nut. Explaining the need for fluxing action. Soldering a splice with a flame or soldering gun. Using various sorts of heat for soldering. Using and storing l.p. soldering equipment with care. Using safety precautions around hot material. Insulating splice with electricians tape. Installing fuses in the disconnect switch	Lecture. Demonstration.	Side Cutters. Wire Nuts. Bernz-Matic Torch. Flux. Rosin Core Solder. Electric Soldering Copper. Electricians Tape. 20 Amp Fuses. Knife.	Comparing soldering of clean and unclean wires. Gaining soldering experience with different heat sources. Splicing and soldering and taping electrical connections.	Observing student work. Testing students on proper soldering practices and safe use of equipment.

TASK NO. 12: INSTALLING ATTIC FANS OR ROOM COOLERS IN BUILDINGS

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading a blueprint to determine proper location of fan. Reading "code" to determine required installations. Explaining the importance of the code. Reading manufacturer's directions for installation.	Lecture.	Directions for Installation. National Electrical Code Handbook, pp. 355-362. House Blueprint.	Reading manufacturer's directions for the installation of various types and makes of water heaters. Reading sections of code concerning installation of water heaters and various other appliances. Studying blueprints of houses and the location of water heaters keeping in mind most efficient use of supplies, materials, and use of heater.	Check students' ability to follow written instructions in both directions and the code. Check student ability in reading blueprints and locating heaters and various appliances and the proper identification of symbols for each.
Measuring to locate an outlet box with a ruler to an accuracy of 1/16 of an inch. Installing switch box with hammer and screwdriver at proper location with extension from framing to allow for interior sheathing to an accuracy of 1/16 of an inch.	Lecture. Demonstration.	6' Folding Rule or Tape Rule. Switch Box. Claw Hammer. Screwdriver. 6D Common Nail. 1" #8 Pan Head Screws.	Installing a switch box at the proper location with the proper projection from framing members.	Observation of student work and checking the accuracy of the work.
Squaring running boards with a framing square to an accuracy of 1/8 of an inch. Cutting running boards to size with a hand saw or power saw to an accuracy of 1/8 of an inch. Installing running boards with a hammer to an accuracy of 1/8 of an inch. Removing bent nails with a bar or hammer. Explaining purpose of grounding electric tools.	Lecture. Demonstration.	6' Folding Rule. Tape Rule. Framing Square. Crosscut Saw. Radial Saw. Portable Electric Saw. Claw Hammer. 8D Common Nail. Step Ladder. Extension Cord with adapter plug. 1 X 3 Stock for Running Boards. Saw Horses. Ripping Bar and Chisel. Leverage Block. Wiring Simplified, H. P. Richter, p. 65.	Laying out given lengths and squaring running boards to an accuracy of 1/8 of an inch. Cutting running boards to an accuracy of 1/8 of an inch. Installing running boards. Removing bent nails.	Observation. Checking accuracy of student work. Test on safe use of power saws.
Drilling holes with an electric drill for installation of cable. E Explaining safety precautions in using an electric drill. Cutting wire to length with side cutters. Installing cable from switch box to fan and from fuse box to switch box. Fastening wire to framing members with a hammer. Protecting cable from damage by overbending.	Lecture. Demonstration.	Extension Cord with adapter plug. Electric Drill. 3/4" or 7/8" Wood Bit. Side Cutters. Non-Metallic Sheathed Cable. Claw Hammer. Staples.	Drill holes in framing members and running cable through these holes. Fastening cable to framing members with staples or cable clamps in accordance with the code.	Check accuracy and safe use of tools while drilling holes. Quiz on proper spacing of staples or cable clamps.

Task No. 12 (continued)

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Removing outer sheathing from cable with a cable stripper. Explaining safe use of the screwdriver. Removing knock-out plugs with a screwdriver. Removing knock-out plugs only when necessary. Installing cable in boxes with connectors and screwdriver. Cutting cable to proper length with side cutters. Removing inner insulation from wires with a knife. Connecting wires to terminals with a screwdriver. Connecting ground wires to box or cable clamp with a screwdriver. Protecting cable from damage from overbending.	Lecture. Demonstration.	Cable Stripper. Non-Metallic Sheathed Cable with ground wires. Screwdriver. Side Cutters. Knife.	Connecting cable to outlet box following "code" requirements. Properly grounding the cable to the box.	Observing student work in terms of proper application of "code."
Splicing wires with a pigtail splice using side cutters. Splicing wires with a wire nut. Soldering a splice with a flame or soldering gun. Using various sorts of heat for soldering. Using and storing I.p. soldering equipment with care. Using safetv precautions around hot material. Insulating splice with electricians tape. Installing fuses in the disconnect switch.	Lecture. Demonstration.	Side Cutters, Wire Nuts. Bernz-Matic Torch. Flux. Rosin Core Solder. Electric Soldering Copper. Electricians Tape. 20 Amp Fuses. Knife.	Comparing soldering of clean and unclean wires. Gaining soldering experience with different heat sources. Splicing and soldering and taping electrical connections.	Observing student work. Testing students on proper soldering practice and safe use of equipment.

OCCUPATIONAL INFORMATION UNIT FOR ELECTRICITY

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
The employment outlook: 1. Local 2. National	Lecture. Guest speaker, a representative from union, a contractor or the Employment Security Office.	Publication: Occupational Outlook Handbook, Report Series #1450-30, 1966-67 edition, Employment Outlook for Construction Electricians, pp. 9-10, Government Printing Office, Washington, D.C.	Visiting local electrical contractors to determine the local employment outlook. Writing a report on the employment outlook.	Reviewing the reports of students' visit to local employers.
The wage scale: 1. Local a. union (1) apprentice (2) journeyman (3) master b. non-union (1) entry wages (2) experienced 2. National a. union (1) apprentice (2) journeyman (3) master b. non-union (1) entry wages (2) experienced	Lecture. Overhead projector.	Teacher-made overhead visuals showing union and non-union wage scales. Publication: Occupational Outlook Handbook, Report Series #1450-30, 1966-67 edition, Employment Outlook for Construction Electricians, p. 10, Government Printing Office, Washington, D.C.	Visiting local employers and union offices to collect information concerning wage scales. Writing a report of union and non-union wage scales.	Reviewing the report of students' visit to local employers and union offices.
Types of training available and means of entry into the occupation: 1. Apprenticeshop programs 2. Technical or trade schools 3. On-the-job 4. Military	Lecture.	Publication: Occupational Outlook Handbook, Report Series #1450-30, 1966-67 edition, Employment Outlook for Construction Electricians, p. 10, Government Printing Office, Washington, D.C. Technical school listings from guidance office of your school. Military pamphlets from recruiting office.	Visiting local electricians and find out the advantages and disadvantages of various types of training. Visiting an apprenticeshop school or a trade school. Developing a chart showing types of training, cost and time required.	Review and evaluate student reports on their conference with electrician and visits to training schools. Checking student notebooks to see work done on charts of various training experiences.
The working conditions experienced in the occupation.	Lecture. Discussion. Field trip to construction sites.	Publication: Occupational Outlook Handbook, Report Series #1450-30, 1966-67 edition, Employment Outlook for Construction Electricians, p. 10. Job Guide for Young Workers, 1963-64 edition, U.S. Department of Labor, Government Printing Office, Washington, D.C., p. 49.	Making lists of advantages and disadvantages of various occupations within the construction cluster.	Checking and reviewing lists made by students.

OCCUPATIONAL INFORMATION UNIT FOR ELECTRICITY (continued)

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
The physical and mental characteristics needed for qualification for employment.	Lecture. Guest speaker from an electrical contracting firm.	Publication: Occupational Outlook Handbook, Report Series #1450-30, 1966-67 edition, Employment Outlook for Construction Electricians, p. 9.	Making list of various characteristics needed for electrical work and comparing them with other phases of construction.	Checking and reviewing list made by students.
			Discussing why main employment is located around large cities.	Review work of student in determining geographical location of employment in nearby population center.
The opportunities for advancement.	Lecture.	Publication: Job Guide for Young Workers, 1963-64 edition, U.S. Department of Labor, Government Printing Office, Washington, D.C., p. 49.	Cutting out "want ads" for electricians from newspapers in the area.	
			Contacting an employment security office in a nearby population center to determine the demand for electricians there.	
			Discussing advancement possibilities with local electricians and contractors.	Reviewing student reports.
The advantages and disadvantages of the occupation.	Lecture. Tradesman as guest speaker.	Teacher-made visuals showing advantages and disadvantages of the occupation.	Compiling a list of advantages and disadvantages of the occupation to be placed in the student notebook.	Reviewing the student notebook.
The nature of the work involved in the occupation.	Lecture. Slide or filmstrip presentation.	Teacher-made filmstrips or slides showing various phase of the occupation. Publication: Occupational Outlook Handbook, Report Series #1450-30, 1966-67 edition, Employment Outlook for Construction Electricians, p. 7.	Reviewing page 7 of book listed and visiting local electrician to discuss nature of the work.	Evaluating reports of student discussion with local electricians.
The union involvement in the occupation.	Lecture. Union representative as guest speaker.	Union literature available from local and national offices.	Listing advantages and disadvantages of union involvement.	Evaluating students' listing. Test students' overall knowledge of the information covered in the occupational unit.

MASONRY

TASK NO. 1: SETTING UP WORK AREA IN ORDER TO EXPEDITE THE MIXING OF CONCRETE ON THE JOB.

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading the blueprint so as not to interfere with building line.	Demonstrating how to read a rule. (Overlay)	Tools: 6'-0 Folding Rule. Materials: Blueprints. Teacher Developed Overlays.	Reading the rule.	Checking how each student reads the rule.
Measuring lumber with a rule to an accuracy of 1/8 of an inch.	Demonstrating measuring lumber.	Tools: 6'-0 Rule. Materials: Lumber.	Measuring lumber.	Checking students measurement of lumber.
Explaining importance of grounding electric power tools.	Demonstrating how to ground electric power tools.	Tools: Portable Saw.	Observing demonstration by instructor. Grounding electrical tools.	Checking how students ground electric tools.
Positioning supplies for ease in shovelling into mixer. Leveling mixer and water barrel with a level.	Demonstrating how to use an electric or gas mixer. Demonstrating how to use a shovel for wet and dry material.	Tools: Electric Mixer. Shovels. Wheelbarrow. Level. Materials: Sand. Gravel. Lime. Cement.	Positioning mixer and supplies. Leveling mixer and water barrel with a level. Protecting materials from weather through storage.	Checking the correct position of supplies, materials and mixer.
Squaring lumber with a framing square to an accuracy of 1/4 of an inch.	Demonstration: Squaring.	Tools: Framing Square. Pencil.	Work Groups: Squaring lumber to an accuracy of 1/4" to construct a 5' X 8' mortar box.	Checking the mortar box for correct size.
Cutting lumber with a hand or power saw to an accuracy of 1/4 of an inch.	Demonstration: Cutting with a power saw.	Tools: Hand Saw. 8D and 10D Nails. Hammer. Materials: 5 pieces, 2" X 10" X 14' long 2 pieces, 2" X 12" X 10' long 4 pieces, 2" X 4" X 14' long	Work Groups: Constructing a mortar hod rack.	Checking the hod rack.
Removing bent nails.	Demonstration: Using a bar.	Tools: Bar. Hammer.	Remove bent nails from hod and mortar box.	Observation.
Protecting oneself by working safely.	Film Strip.	Film Strip: "Safety on Construction Work," National Safety Council.	Viewing film: "Safety on Construction Work"	Discussion of film.

TASK NO. 2: CLEANING AND OILING CONCRETE FORMS PRIOR TO USE

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Removing all nails used in assembling forms.	Demonstration.	Tools: Bar. Hammer.	Remove nails and place them in a can.	Observe students removing nails.
Hammering forms with a rubber mallet to loosen cement.	Demonstration.	Tools: Rubber Mallet.	Loosen cement with a mallet.	Check the form for hard cement.
Scraping form with a hoe to remove cement.		Tools: Mortar Hoe. Brick Trowel.	Scrape cement from form with hoe and brick trowel.	Check the form for adequate removal of hard cement.
Brush off loose cement and apply oil to the form surface.	Demonstration: Oiling Forms.	Tools: 2" and 4" Brush. Materials: Oil.	Brush and oil the surface.	Inspect the form for proper oiling.
Protecting oneself by working safely.	Discussion.	Pamphlet: Safety in Construction Work, Portland Cement Association, NA 8-3967 (D.C.)	Viewing film: "Safety on Construction Work."	Discussion of film.

TASK NO. 3: PREPARING A BATCH OF CEMENT, PLASTER, LIME MORTAR AND CEMENT-LIME MORTAR BY HAND AND BY MACHINE.

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Receiving and interpreting vocal instructions on plasterer.	Programmed Instruction. Lecture.	Materials: Specifications. Programmed Instruction: Bricklaying Vocational Training, Students Textbook, Roark and Plummer.	Class: Reading Chapter #3, Bricklaying Vocational Training, Roark and Plummer.	Pencil and paper test on Chapter #3, take questions from study guide, Vocational Training.
Reading a blueprint and specifications to determine mix proportions.	Demonstration with overhead projector.	Material: Overhead Projector. Specifications.	Listening and viewing lecture by instructor with overhead projector.	Discussion on specifications.
Proportioning concrete by using mathematics. Also explain safety.	Programmed Instruction. Demonstration.	Tools: Shovel. Wheelbarrow. Materials: Pail. Programmed Instruction: Masonry Simplified, Vol. #1, Chapter 2.	Finding the volume of cu. ft. of area. Measuring proper amount of ingredients with a shovel or pail. Reading Chapter 2, Masonry Simplified, Vol. I.	Check students on finding the volume and measuring ingredients.
Measuring, inserting, and mixing ingredients by hand and machine.	Demonstration with four (4) students.	Tools: Shovels. Wheelbarrow. Electric Mixer. Materials: Sand. Lime. Portland Cement. Mortar Cement. Water. Hose. Pail.	Measuring proper amount of ingredients with a shovel. Inserting ingredients into mixer or mortar box in proper order with a shovel.	Observe and check the class proportioning ingredients for mortar and cement.
Mixing ingredients dry and with water. Then, performing a slump test.	Demonstration with class participation.	Tools: Shovels. Mortar Hoe. Wheelbarrow. Brick Trowel. Materials: Mixer. Sand. Portland Cement. Pea Gravel. Mortar Cement. Hose. Metal Cone.	Class: Mixing ingredients dry with hoe and machine. Adding proper amount of water to mix with a pail. Performing a slump test to meet specifications of job.	Observe students mixing ingredients by hand and electric mixer.

Task No. 3 (continued)

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Cleaning up mixer following use with stone, water and wire brush. Cleaning up tools following use with water and brush.	Discussion care of tool and equipment.	Tools: Shovels. Hoe. Wheelbarrow. Brick Trowel. Materials: Mixer. Sand. Gravel. Metal Cone. Leftover Cement.	Class: Cleaning up mixer following use with stone, water and wire brush. Cleaning up tools following use with water and brush.	Observe and check students cleaning up tools.
Explaining the need to adjust water, measuring accurately and keeping cement shovel dry.	Class Discussion. Programmed Instruction.	Tools: Brick Trowel. Materials: Water Hose. Pail. Programmed Instruction: Information sheet on mixing ingredients.	Class divided into two groups: Discussion on measuring accurately and adjusting water. Reading the information sheet on measuring an and adjusting water when sand is wet.	Observation.

TASK NO. 4: SHORING SIDEWALLS OF EARTHEN DITCHES TO PREVENT CAVE-INS DURING EXCAVATION.

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Measuring lumber.	Direct Reading Assignment.	Tools: 6' Rule. Materials: Audels Masons and Builders Guide, Vol. #4	Assignment: Reading Audels Masons and Builders Guide, Vol. #4, Audel, pp. 850-853.	Discussion of questions related to shoring.
Adding, subtracting, dividing, multiplying, to economically cut stock.	Demonstration: Adding, subtracting, dividing and multiplying.	Materials: Bricklaying #1, Structural Clay Products Institute.	Assignment: Study Unit #3, Bricklaying I, Structural Clay Products, pp. 44-48, Do problem 5, p. 48.	Check problem #5, p. 48.
Grounding tools.	Review. Discussion.	Electric Tools.	Review grounding electric tools.	Check.
Squaring cuts and cutting lumber to 1/8" accuracy.	Demonstration. Review.	Tools: Hand Saw. Power Saw. Square. Materials: Lumber.	Practice in squaring and cutting lumber.	Observing students at work.
Setting stakes by: a. Driving. b. Nailing.		Tools: Hammer. Sledge Hammer. Materials: Nails. Stakes.	Setting stakes in place using a project form.	Observing students at work.
Explaining safety precautions for the worker near unstable earth.	Lecture	Braces.	Group discussion on bracing for security.	Observing students bracing their work.

TASK NO. 5: INSTALLING RODS AND SPREADERS TO SPACE FORM SECTIONS

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading the blueprint.	Programmed Instruction. Demonstration.	Tools: Drawing Scale. 6' Rule. Materials: Pictorial view of a form. Programmed Instruction: Information Sheets.	Reading a blueprint to determine spacing of rods and spreaders. Assignment: Reading, pp. 8-23, Masonry Simplified, Vol. II, Dalzell and Townsend.	Observing students reading the blueprint.
Measuring lumber.	Demonstration measuring lumber.	Tools: 6' Rule Materials: Lumber	Measuring lumber.	Checking students measurement of lumber.
Adding, subtracting, multiplying and dividing.	Chalkboard demonstration. Programmed Instruction.	Materials: Chalkboard. Programmed Instruction: Mathematics for Masonry Trades, Delmar Publishers,	Class: Adding, subtracting, multiplying and dividing in order to economically cut stock to correct lengths. Assignment: Mathematics for Masonry Trades, Delmar, p. 35, Work problems #5, 9, and 14.	Check the three (3) problems and pass them back to class.
Explaining pressure of concrete and grounding tools.	Programmed Instruction. Lecture.	Materials: Masonry Simplified, Vol. II.	Class: Reading, pp. 81-86, Masonry Simplified, Vol. II. Listening to lecture by instructor.	Checking and observing students working on reading assignment.
Marking and cutting spreaders.	Demonstration with class.	Tools: Framing Square. Pencil. Hand Saw. Power Saw. Materials: 2" X 4", 1" X 4" and 2" X 2" wood stock.	Class: Marking end spreaders with a framing square or sliding T-bevel to an accuracy of 1/16 of an inch. Cutting spreaders to proper length with a hand or power saw, to an accuracy of 1/16 of an inch.	Observation of students marking and cutting spreaders.
Nailing spreaders for security and tightening rods.	Demonstration with class. Programmed Instruction.	Tools: Hammer. Two-Headed Nails. Wrench. Materials: Transparencies. Overhead Projector.	Class: Assignment. Viewing transparencies of a standard size form. Nailing spreaders for security but easy removal, with a hammer. Tightening rods through forms to an even tension with a wrench.	Checking how well students are able to nail spreaders.

Task No. 5 (continued)

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Drilling holes in form and removing bent nails.	Demonstration	Tools: Power Drill Bar Hammer Materials: Form Nails	Drilling holes in form by three students. Removing bent nails with a bar.	Check how students drill holes in the form.
Protecting Oneself	Filmstrip	Filmstrip: "Safety on Construction Work," National Safety Council.	Viewing film: "Safety on Construction Work."	Discussion of film.

TASK NO. 6: WIRING AND BOLTING FORMS TO PREVENT SPREADING

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading a blueprint to determine spacing of wiring and bolts.	Directed Study.	Tools: Scale. 6' Rule. Materials: Masonry Simplified, Vol. II, Dalzell.	Assignment: Study blueprint and read pp. 185-187, Masonry Simplified, Vol. II.	Paper and pencil test based on reading pp. 185-187.
Measuring wire for length.	Programmed Instruction.	Tools: 6' Rule. Materials: Wire. Instruction Sheets.	Reading instruction sheet to locate lengh length of wire.	Checking measurement of wire.
Explaining pressure developed by concrete when pouring.	Programmed Instruction.	Materials: Masonry Simplified, Vol. II.	Study Figure 38, p. 187, Masonry Simplified, Vol. II.	Check students understanding of bracing.
Cutting wire with side cutting pliers.	Demonstrating cutting wire.	Tools: Power Drill Materials: Wire. Bolts.	Work Groups: Cutting wire to proper length with side cutting pliers.	Observe students cutting wire.
Drilling holes for wire and bolts.	Drilling demonstration.		Drilling holes for wire and bolts by hand and electric drill.	Checking students using the drill.
Inserting wire in the form.	Demonstration.	Tools: Pliers. Hammer. Materials: Wire. Form.	Insert wire in the form for a concrete lintel.	Observe students inserting wire in a form.
Twisting wire in form to proper tension.	Demonstration: Tensioning wire.	Materials: Wire.	Twist wire in form to proper tension.	Observe students tensioning wire.
Tightening bolts to an even tension with a wrench.	Demonstration: Using a Wrench.	Tools: Wrench. Materials: Bolts. Spacers.	Tighten bolts to an even tension with a wrench.	Check students tightening bolts.
Demonstrating the proper use of adjustable wrenches.	Demonstration.	Tools: Wrenches. Materials: Forms.	Participation in demonstration of adjustable wrench use.	Observation of student demonstration.
Demonstrating safe use of a step ladder.	Demonstration.	Material: 6' Step Ladder.	Participation in the safe use of a step ladder.	Check students use of the step ladder.
Using tools safely.	Demonstration.	Pliers. Hammer.	Using tools safely.	Observation.

TASK NO. 7: BRACING SIDEWALLS OF FORM TO PREVENT SPREADING.

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading the blueprint for bracing details.	Programmed Instruction.	Tools: Drawing Scale. Materials: Blueprint. Programmed Instruction: Transparencies.	Class: Reading a blueprint to determine bracing specified for the job. Viewing teacher made transparencies to learn how to brace.	Observation of students reading the blueprint.
Measuring Lumber.	Review.	Rule.	Measuring lumber to an accuracy of 1/16 of an inch.	Observing students measuring.
Adding, subtracting, multiplying and dividing.	Programmed Instruction.	Materials: Pencil and Paper. Programmed Instruction: Mathematics for Carpenter, Delmar.	Adding, subtracting, multiplying and dividing in order to economically cut stock to correct length. Assignment: Problem #1, p. 8, Mathematics for Carpenters, Delmar.	Check problem on p. 8 and pass papers back to students.
Explaining pressure developed by concrete.	Lecture and Discussion. Programmed Instruction.	Programmed Instruction: Concrete Technology, Portland Cement Assoc.	Reading Chapter #13, Concrete Technology, Portland Cement Association. Participating in lecture discussion.	Observing and recording students participating in discussion and lecture.
Explaining importance of grounding tools.	Discussion.	Electrical Tools.	Grounding Tools.	Observation.
Squaring cuts and cutting with a hand or power saw.	Demonstration.	Tools: Hand Saw. Power Saw. 2" X 4" Stock. Framing Square.	Squaring and cutting braces.	Observation.
Nailing braces and removing bent nails.	Demonstration with class.	Tools: Hammer. Bar. Materials: 2" X 2" and 2" X 4" Wood Stock.	Nailing braces securely with a hammer. Removing bent nails with a hammer or bar.	Observe students removing bent nails and nailing braces.
Sharpening stakes and driving stakes.	Demonstration with class.	Tools: Hammer. Axe. Sledge Hammer. Hatchet.	Sharpening stakes with saw or axe. Driving stakes with a sledge hammer.	Observe students driving stakes.
Explaining safety: a. Power Saw. b. Earth Cavein. c. Effective Bracing. d. Step Ladder. e. Protecting Oneself.	Demonstration. Lecture.	Power Saw. Step Ladder.	Explain and discuss safety.	Quiz.

TASK NO. 8: INSTALLING ANCHOR BOLTS IN MASONRY AND CONCRETE TO PROVIDE A PLACE FOR SECURING FUTURE CONSTRUCTION.

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading the drawing to determine: a. Diameter of bolts. b. Location. c. Length of exposure.	Programmed instruction. Demonstration using the overhead projector.	Tools: 6' Rule Materials: Blueprint of a two car brick garage. Bricklaying II	Reading the blueprint while teacher explains. Making a sketch of the right elevation showing the spacing of bolts.	Observe students while find the size, location, and exposure of bolt.
Measuring wall or slag with a rule to find location of bolts within an accuracy of 1/8 of an inch.	Demonstration and explaining. Measuring and spacing bolts.	Tools: 6' Rule or Tape. Materials: Blueprint or Drawing.	Measure wall or concrete so as to locate bolts with accuracy. Have students vary their measurement.	Observe students while measuring wall.
Blocking off cells in concrete block walls with paper at a depth so head of bolt will be surrounded by cement.	Demonstration and explanation.	Tools: Trowel. Rule. Materials: Blocks, Bolts. Paper. Mortar.	Have class block of cells or mortar joints to proper depth. They can use paper or small chip of brick.	Observe students practicing.
Using a trowel to fill and puddle cement around the bolt head.	Explanation and demonstration.	Tools: Trowel Materials: Block. Brick Cement. Bolts.	Filling cavity puddling cement around bolt, and placing bolt in cement.	Observe students working.
Checking bolts for plumb and proper exposure.	Demonstration using the live job.	Tools: Rule. Materials: Brick.	Using a rule to check bolts.	Observe students.
Explaining the importance of not leaving an air cavity around bolt head.	Discussion and using the live job.	Material: Cinder block wall.	Have students inspect their bolts, make necessary corrections.	Observation.
Know the meaning of o.c. abreviation that appears on drawings.	Discussion Demonstrating with the overhead projector. using the two car garage print.	Blueprint of a two-car brick garage.	Reading the blueprint of a two car brick garage to study on center abbreviation.	Observation.

TASK NO. 9: PROTECTING A CONCRETE SLAB FOLLOWING FINISHING OPERATIONS TO PROVIDE FOR PROPER CURING

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading the specifications and blueprint to determine recommended protection for curing.	Programmed Instruction Explaining material on p. 102, Masonry Simplified, Vol. I. Review measurement lesson.	Tools: 6' Rule. Materials: Blueprint. Programmed Instruction: Masonry Simplified, Vol. I, Dalzell	Reading the specifications or prints while teacher explains. Study on pp. 94-103, Masonry Simplified, Vol. I, Dalzell.	Checking students ability to understand material found in the specifications.
Measuring Lumber.	Review measurement lesson	Tools: 6' Rule. Scrap Lumber.	Measuring lumber.	Check student measurements.
Grounding electricity.	Review Grounding of electricity.	Electrical Tools.	Grounding electrical equipment.	Observation.
Covering concrete with straw, canvas, and polyethylene to slow down drying or to provide protection from freezing.	Programmed Instruction. Demonstration.	Materials: Canvas. Programmed Instruction.	Constructing side supports for a canvas. Then sprinkling canvas and concrete with water.	Checking how students place cover over concrete.
Checking temperature of concrete with a thermometer to determine if it is safe from freezing.	Programmed Instruction. Demonstration.	Thermometer. Cold Concrete.	Check the temperature of concrete with a thermometer to determine if safe from freezing.	Observe the reading of thermometers by each student.
Selecting hand tools to construct sun shades and wind breaks.	Programmed Instruction. Demonstration.	Tools: Rule. Hammer. Square. Hand Saw. Power Saw. Bar. Materials: 4' X 8' Plywood. Programmed Instruction: Job Sheet.	Squaring lumber with a framing square to an accuracy of 1/8 of an inch. Cutting lumber with a hand saw or power saw to an accuracy of 1/8 of an inch. Constructing sun shades and wind breaks with a hammer to prevent rapid drying. Removing bent nails with a bar or hammer.	Checking the students on how they construct a wind break and sun shades.
Starting heaters for protection and sprinkling concrete to reduce evaporation.	Demonstration. Lecture.	Materials: Hose. Water. Heater. Fuel.	Starting and shutting off fuel burning heaters such as salamanders. Sprinkling concrete with water hose to reduce evaporation of water from concrete.	Observing how students set up and start heaters. Observing how students reduce evaporation of water from concrete.
Explaining temperature control and safety.	Lecture.	Materials: Thermometer. Programmed Instruction: Masonry Simplified, Vol. I	Explaining need for temperature control of concrete. Assignment: Reading, Masonry Simplified, Vol. #1, pp. 101-103, Dalzell.	Paper and pencil test. Select five (5) questions made up from task #9.

TASK NO. 10: ERECTING SCAFFOLD FOR USE BY A MASON

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading the blueprint and specifications to determine type of scaffold.	Programmed Instruction.	Tools: Scale. Materials: Blueprint. Programmed Instruction: Practical Bricklaying, Briggs and Carver	Reading a blueprint and specifications to determine type of scaffolding specified. Programmed Instruction: Reading pp. 46-53, Practical Bricklaying, Briggs and Carver.	Observe students reading the blueprints and specifiecations. Observing and asking questions about reading on pp. 46-53.
Measuring Lumber.	Demonstration and discussion	Tools: 6' Rule. Steel Tape. Materials: 2" X 10" 2" X 4" 1" X 4"	Measuring lumber with a rule to an accuracy of 1/4 of an inch.	Checking the measurements made by the students
Adding, subtracting, multiplying and dividing.	Class demonstration.	Tools: Pencil. Materials: Paper. Chalkboard.	Constructing figure 34, Practical Bricklaying, Briggs and Carver, p.46.	Check and observe students constructing figure 34, p. 46, Practical Bricklaying, Briggs and Carver.
Erecting low scaffold.	Class Demonstration. Programmed Instruction.	Tools: Level Hammer Materials: 8" X 8" X 16" Cinder Block 2" X 10" Boards Programmed Instruction: The Art of Bricklaying, Edgar Ray.	Erecting a low scaffold with concrete block and plank. Assignment: Study, Figure 76, p. 213, The Art of Bricklaying.	Checking how student erect scaffolding.
Squaring, cutting and nailing lumber.	Demonstration. Programmed Instruction.	Tools: Hammer. Square. Hand Saw. Power Saw. Materials: 2" X 4" 4" X 4" 1" X 6" 2" X 8" Programmed Instruction: A drawing of a two section scaffold.	Constructing a two section scaffold by squaring, cutting, and nailing lumber to an accuracy of 1/8 of an inch.	Observe and check the students for accuracy in constructing a two section scaffold.
Bracing scaffolding, sharpening stakes, and driving stakes.	Group Demonstration.	Tools: Axe. Hatchet. Hammer. Sledge Hammer. Power Saw. Hand Saw.	Bracing scaffolding securely with cross members. Sharpening stakes with an axe or saw and driving stakes with a sledge hammer.	Observe student preparing cross members and stakes.

Task No. 10 (continued)

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Bracing scaffolding, protecting bottom of scaffold, leveling members and removing bent nails.	Group Demonstration.	Tools: Sledge Hammer. Hammer. Axe. Bar. Saw. Materials: 2" X 2" 1" X 6"	Bracing scaffolding from stakes. Protecting bottom of scaffold pole from sinking into ground with a flat stone or board .	Observe students bracing scaffold and protecting bottom of scaffold.
Removing bent nails.	Demonstration: Using a Bar.	Tools: Bar. Hammer.	Removing bent nails.	Observe Students.
Safe work practices.	Discussion.	Tools: Power Saw. Materials: VArious sizes of lumber.	Listening to teacher explaining safe practices.	Observe students working safely.
Understanding what scaffold must support.	Discussion and Questions.	Materials: Lesson Plan.	Listening to discussion about how scaffold must support worker and materials.	Checking students Oral answers on scaffolding.
Checking lumber for defects.	Demonstration.	Tools: Hammer. Materials: Scaffold.	Checking lumber for defects (knots) prior to using.	Observe how students check lumber.

TASK NO. 11: CLEANING OUT MORTAR JOINTS FOR TUCK-POINTING

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Removing cement mortar.	Demonstration using one student.	Tools: Hammer. Chisel. Materials: Brick Wall.	Removing cement of mortar with hammer and chisel to a depth of one inch.	Observe students removing cement mortar.
Removing cement with pneumatic chisel.	Demonstration.	Tools: Pneumatic Chisel. Materials: 8" Wall.	Removing cement or mortar with a pneumatic chisel to a depth of one inch.	Checking students using the pneumatic chisel.
Cleaning out chips.	Demonstration.	Tools: Hose. Brush. Materials: Water. Air Hose.	Cleaning out chips and dust with water or air.	Observe students using air hose or water and brush.
Using a dust mask. Explaining safety with pneumatic chisel.	Discussion and demonstration.	Tools: Pneumatic Chisel. Materials: Dust Mask.	Participation in the demonstration with the dust mask. Also listening to discussion on safety.	Checking students oral questions on the dust mask.
Removing all loose mortar.	Demonstration using students.	Tools: Hammer. Chisel. Water Hose. Brush. Pneumatic Chisel.	Removing all loose mortar even beyond a depth of 1".	Observing students removing all loose mortar.
Demonstrating safe use of extension ladder.	Demonstration with students.	Tools: Ladder.	Participating in learning how to use the extension ladder.	Observe students using the extension ladder.

TASK NO. 12: POINTING UP A SECTION OF BRICK WALL TO PROVIDE FINISHED APPEARANCE

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading the sketch and specifications.	Programmed Instruction. Demonstration.	Tools: Scale. Materials: Blueprint. Job Specifications.	Reading the blueprint and specifications to determine the type of pointing required.	Checking students reading the blueprint and specifications.
Finishing a wall with a concave or V-jointer.	Demonstration with the class.	Tools: Concave Jointer. V-Jointer. Brush.	Finishing a wall with a concave or v-shaped joint using a jointer.	Checking students jointing a wall section.
Finishing a wall with a weathered joint.	Programmed Instruction. Demonstration.	Tools: Brick Trowel. Pointing Trowel. Brush. Materials: Brick Wall Section. Programmed Instruction: Bricklaying I, Structural Clay Products Institute.	Finishing a wall with a weathered joint using a trowel. Assignment: Reading, Bricklaying I, Structural Clay Products Institute.	Observing students jointing a wall section.
Finishing a wall with flush and struck joint.	Demonstration with class.	Tools: Brick Trowel. Brush. Materials: Brick Wall. Mortar.	Finishing a wall with a rough cut or flush joint using a trowel. Finishing a wall with a struck joint using a trowel.	Checking each student's work.
Finishing a wall with a raked joint.	Demonstration.	Tools: Raked Jointer. Brush. Brick Trowel. Materials: Section of Brick Wall.	Finishing a wall with a raked joint using a joint raker.	Checking each students work area for a complete raked joint.
Cleaning all tools.	Demonstration.	Tools: Steel Wire Brush. Pail. Materials: Water. Hose. Chisel.	Cleaning tools following use with water and a steel brush.	Checking all tools used on the job.
Knowing advantages of the various pointing-up techniques.	Lecture. Demonstration.	Chalkboard Diagrams.	Listening to lecture demonstration by instructor on the advantages and disadvantages of the various pointing-up techniques.	Observe students participation in lecture demonstration by their various responses.

TASK NO. 13: APPLYING COLORLESS COATING TO WATERPROOF MASONRY SURFACES ABOVE GRADE ON A BUILDING.

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading manufacturer's instructions for application.	Programmed instruction.	Tools: Scale. 6' Rule. Materials: Blueprint.	Group discussion reading manufacturer's instructions for application. Take pencil and paper checklist quiz.	Pencil and paper checklist on application checked by instructor.
Measuring perimeter.	Demonstration and programmed instruction.	Tools: Folding Rule. Materials: 8" Cinderblock Wall. Programmed instruction: Transparencies.	Measuring perimeter of area to be coated with a ruler accurate to nearest foot. Observing a demonstration on measurement with the overhead projector using transparencies.	Checking and observing students while they are measuring wall area.
Changing gallons to quarts and pints.	Chalkboard demonstration.	Materials: Chalkboard. Table of Weights.	Dividing the gallon into quarts and pints to determine quantity required for area to be covered. Observe demonstration on chalkboard.	Observing students changing gallons to quarts and pints.
Multiplying and Dividing.	Demonstration on chalkboard.	Materials: Tape. Rule. Chalkboard.	Multiplying to compute area to be covered. Dividing in order to find volume necessary for area to be covered.	Checking students on how well they can find square feet and volume.
Cleaning area.	Demonstration with students.	Tools: Stiff Broom. Wire Brush. Materials: Water Hose. Acid or Other Material.	Cleaning area to be covered with stiff broom.	Inspecting the cleaned area.
Preparing and applying material.	Demonstration and explanation.	Tools: Paint Opener Paint Brush Cloth Hammer Materials: Paint Container	Opening a can of material with a paint can opener. Applying coating with a brush.	Observing students opening and applying paint on a masonry wall.
Cleaning and re-sealing container.	Explanation.	Tools: Cloth. Hammer. Materials: Paint Container.	Cleaning rim of container free of finishing material.	Observing students cleaning and resealing can.
Cleaning the applicator.	Demonstration.	Tools: Brush. Materials: Paint.	Cleaning applicator.	Checking students applicator.
Protecting the area.	Demonstration.	saw horse.	Protecting coated area from traffic until dry.	Checking how students protect coated area.
Protecting oneself.	Discussion during demonstration.	(All materials used in Task No. 13).	Participate in discussion.	Checking student's understanding of working safely.

TASK NO. 14: APPLYING ASPHALT COATING TO WATERPROOF FOUNDATION WALL BELOW GRADE

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading manufacturers instructions.	Discussion. Lecture.	Materials: Manufacturer's Instructions.	Group discussion reading manufacturer's instructions for application. Take pencil and paper checklist quiz.	Pencil and paper checklist on application checked by instructor.
Reading blueprint.	Demonstration. Discussion.	Materials: Blueprint.	Reading blueprint to determine height of application and number of coats required.	Observing student's reading the blueprint
Measuring height of asphalt coating.	Demonstration. Programmed Instruction.	Tools: Tape. Line. Rule. Materials: Cinderblock Wall. Programmed Instruction: Mathematics for Masonry.	Measuring height of asphalt coating with a ruler accurate to the nearest inch. Assignment: Use paper and pencil to work problems 4 and 8, page 29, Mathematics for Masonry.	Observing students measuring wall space. Correct problems #1 and #8 on page 29.
Protecting combustable material.	Discussion.	Tools: Brush. Materials: Asphalt.	Discussion - protecting combustable material when heating it.	Evaluating students participation in discussion.
Cleaning area.	Demonstration.	Tools: Chisel. Hammer. Hoe. Stiff Broom. Materials: 8" Cinderblock Wall.	Cleaning the area to be coated with a chisel and stiff broom.	Checking student's cleaning area.
Opening materials and heating in cold weather.	Demonstration.	Tools: Hammer. Pry Bar. Materials: Asphalt.	Opening and heating asphalt prior to use.	Observing student's opening and heating asphalt asphalt.
Applying coating.	Demonstration.	Tools: Large Brush. Plastering Trowel.	Applying coating with a brush being sure to cover joint between wall and footing.	Checking each student for correct method of application.

Task No. 14 (continued)

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Cleaning, storing and resealing.	Discussion with class.	Tools: Brush. Trowel. Materials: Can of Asphalt.	Cleaning and storing applicator. Resealing can of asphalt coating with a hammer.	Observing and checking the applicator and can of asphalt.
Planning work schedule and working orderly.	Lecture. Discussion and explanation.	Materials: Work area.	Plan schedule to work in the sun also applying coating in an orderly manner to insure personal cleanliness.	Observing how students work and plan.
Examining surface.	Group investigation.	Materials: Cinderblock Wall.	Examining cement surface to be sure pores are sealed.	Checking surface area.

TASK NO. 15: POURING A SECTION OF FOOTING CONTAINING REINFORCING RODS

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Explaining: a. Pressure. b. Grounding tools.	Programmed Instruction.	Tools: Chalk. Materials: Chalkboard. Programmed Instruction: Concrete design and Construction, Gibson.	Listening to explanation of pressure developed by concrete when poured in place. Reading pp. 280-284, Concrete Construction and Design, Gibson.	Checking student's understanding of reading material.
Removing debris and checking form.	Demonstration. Programmed Instruction.	Tools: Shovel. Rake. Trowel. Brush. Materials: Wood Form. Programmed Instruction: Masonry Simplified, Vol. II.	Reading pp. 77-86, Masonry Simplified, Vol. II, Dalzell. Removing any debris from cavity to be poured and checking form to be sure it is secure and clean.	Observing students reading and checking forms.
Wetting form and placing concrete.	Demonstration by groups.	Tools: Shovel. Rake. Brick Trowel. Brush. Materials: Concrete Form.	Wetting forms and surrounding earth. Placing concrete in form where needed.	Checking students wetting forms and placing concrete.
Puddling and leveling.	Demonstration.	Tools: Hoe. Hammer. Screed. Trowel. Materials: Wood Form.	Puddling or vibrating concrete with hoe. Leveling top with a screed.	Checking how students puddle and level concrete.
Checking for low spots. Clean Tools.	Demonstration.	Tools: Screed. Trowel. Materials: Wood Form.	Checking the top concrete for low spots. Cleaning tools with wire brush and water.	Observing students. Checking low spots and cleaning tools.
Explaining purpose: a. Vibrating. b. Placed rather than pushed.	Lecture and demonstration. Programmed Instruction.	Materials: Overhead Projector. Programmed Instruction: Transparencies.	Listening to explanation for purpose of vibrating concrete. Explanation why concrete should be placed rather than pushed. Viewing transparencies.	Checking students participation in discussion.
Explaining precaution when using electric tools.	Discussion.	Electrical Tools.	Listening to discussion on precaution when vibrating concrete.	Checking students understanding of working safely.

TASK NO. 16: POURING A SMALL REINFORCED CONCRETE SLAB SUITABLE FOR A PORCH DECK

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Explaining pressure.	Programmed instruction.	Programmed instruction. Concrete Design and Construction, Gibson.	Assignment: Listening to explanation of pressure developed by concrete when poured in place. Reading pp. 280-284, Concrete Construction and Design, Gibson.	Checking student's understanding of reading material.
Removing debris and checking forms. Pouring concrete. Use wire mesh in place of rods. Puddling and leveling concrete.	Demonstration.	Tools: Shovel. Rake. Trowel. Brush. Wood Forms.	Removing debris and checking forms. Pouring concrete. Using wire mesh in place of rods. Puddling and leveling concrete.	Observation of student performance.
Finding volume.	Programmed instruction.	Materials: Chalkboard. Programmed instruction: Mathematics for Masonry Trades, Delmar.	Finding volume by doing problem #3, p. 38, Mathematics for Masonry Trades.	Checking students math problems.

TASK NO. 17: INSTALLING FOOTER FORMS TO RECEIVE CONCRETE

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading blueprint to determine: a. Type of form. b. Location.	Discussion.	Tools: Scale. Tape. Rule. Materials: Blueprint.	Reading the blueprint to determine types and location.	Observe students reading the blueprint.
Measuring and installing footer forms.	Demonstration. Programmed instruction.	Tools: 6' Rule. Materials: 2 pieces 1" X 6". 8" long. Programmed instruction: Masonry Simplified, Vol. I, Dalzell.	Measuring and installing footer forms. Assignment: Reading pp. 77-87 for review, Masonry Simplified, Vol. II, Dalzell.	Observing and checking students doing skills. Discussion of the review reading.

TASK NO. 18: SETTING A SECTION OF SIDEWALK FORM TO RECEIVE CONCRETE

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading the blueprint to determine method of installing.	Programmed instruction.	Tools: Scale. Materials: Blueprint. Overhead Projector. Programmed instruction: Transparencies.	Reading a transparencies of the blueprint to determine method of installing forms.	Checking how well students understand the blueprint.
Sawing, sharpening and driving stakes.	Demonstration.	Tools: Saw. Axe. Sledge Hammer. Materials: 2" X 4" 1" X 2"	Squaring cuts with a framing square. Cutting material to size with hand or power saw. Sharpening stakes.	Observation.
Leveling, Nailing, removing bent nails and bracing form.	Demonstration with class.	Tools: Hammer. Saw. Level. Materials: 2" X 4" 1" X 2"	Laying out assignment. Leveling stakes, nailing stakes, removing bent nails.	Observe students in their assignment.
Safety precautions.	Discussions.	Film Strip.	Observe safety precautions.	Observation of students.

TASK NO. 19: FINISHING A SMALL CONCRETE SLAB TO PROVIDE UTILITY AND PLEASING APPEARANCE

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading a blueprint and specifications to determine finish specified.	Programmed Instruction.	Tools: Scale. Materials: Blueprint. Specifications. Programmed Instruction: Masonry Simplified, Vol. I, Dalzell.	Reading the prints and specifications to determine finish. Reading p. 97-98, Masonry Simplified, Vol. I, Dalzell.	Checking student's knowledge of the print.
Leveling the slab, edging and floating.	Demonstration.	Tools: Screed. Float Darby. Edger. Pointing Trowel. Materials: 2" X 6" Slab Form.	Leveling slab after screeding with float or darby. Edging after water disappears. Floating the slab.	Observing finishing operations by student.
Trowel the surface and finishing with a broom.	Demonstration.	Tools: Cement Trowel. Broom.	Troweling the slab and finishing with a broom.	Observing finishing operations.
Cleaning up.	Demonstration.	Dirty Tools.	Cleaning up tools after work with a wire brush.	Checking the tools before leaving work area.
Protecting oneself.	Discussion.	Tools.	Listening to review discussion on safety.	Pupil administered self-checking quiz.

TASK NO. 20: LAYING CEMENT BLOCK FOR A WALL IN STRETCHER COURSE

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading the drawing to determine the location, length, height and thickness.	Demonstration. Discussion.	Tools: Scale. Rule. Materials: Blueprint.	Reading the blueprint to determine location, length, height and thickness.	Checking students reading the drawings.
Measuring height of wall.	Demonstration.	Tools: Rule. Wood Stock. Materials: 8" X 8" X 16" Block.	Measuring height of wall and make a course rod for cinder block.	Checking students course rod.
Estimating.	Demonstration.	Materials: Chalkboard.	Dividing to find the number of blocks in one course.	Checking each student's estimate.
Building an 8" block lead.	Programmed Instruction.	Tools: Level. Trowel. Hammer. Materials: 8" X 8" X 16" Cinder Blocks. Programmed Instruction: Bricklaying I, Structural Clay Products, Institute.	Construct 8" leads for the wall on p. 195, Bricklaying I, Structural Clay Products Institute.	Checking each lead.
Setting up a line.	Demonstration.	Tools: Hammer. Line Blocks. Materials: 8" X 8" X 16" Cinder Block	Setting up a line with hammer and nails or corner block.	Observing how students set up line.
Cutting block.	Demonstration.	Tools: Brick Hammer. Rule. Materials: Cinder Block.	Cutting cinder blocks with a hammer.	Observe students cutting block.
Laying blocks a. Bed Joint. b. Head Joint.	Demonstration.	Tools: Brick Trowel. Materials: Cinder Blocks.	Laying blocks to the line by: a. Bed Joint. b. Head Joint.	Observing students laying block to the line.
Leveling and plumbing blocks.	Demonstration.	Tools: Brick Trowel. Hammer. Level. Materials: 8" X 8" X 16" Blocks.	Level block, to line with trowel or hammer. Plumbing block face to previous course with trowel handle or hammer using the eye.	Observing students laying blocks to the line.

TASK NO. 21: LAYING UP THE FOLLOWING BONDS WITHOUT MORTAR TO ILLUSTRATE A BASIC KNOWLEDGE OF EACH (RUNNING, COMMON, FLEMISH, ENGLISH, BASKETWEAVE).

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading a blueprint to determine the type of bond specified.	Demonstration. Programmed Instruction.	Tools: Scale 6' Rule Materials: Blueprint Programmed Instruction: Bricklaying Vocational Training, Structural Clay Products Institute.	Reading a blueprint to determine the type of bond specified.	Checking how well students understand the bond.
Interpret bond layout.	Demonstration With class.	Tools: Straightedge Materials: Drawing	Interpreting bond layout diagrams in order to layout bond correctly.	Checking students on understanding diagram.
Running bond.	Demonstration. Discussion. Programmed Instruction.	Tools: Straightedge Materials: Common Brick Programmed Instruction: Bricklaying Vocational Training, Structural Clay Products Institute.	Layout running bond of four courses without mortar. Study project #2, Bricklaying Vocational Training, Structural Clay Products Institute.	Checking each students bond.
Flemish bond.	Demonstration. Programmed Instruction.	Tools: Straightedge Materials: Common Brick Programmed Instruction: Bricklaying Vocational Training, Structural Clay Products Institue	Layout flemish bond for an 8" wall of 4 courses without mortar. Study project #26, Bricklaying Vocational Training.	Checking and observing students on laying out bond.
Common bond.	Programmed Instruction.	Tools: Straightedge Materials: Common Brick Programmed Instruction: Bricklaying Vocational Training, Structural Clay Products Institue	Layout a common bond for an 8" wall of 7 courses without mortar. Study project #3, Bricklaying Vocational Training, Structural Clay Products Institute.	Checking each students bond for correctness.
English Bond.	Demonstration.	Tools: Straightedge Materials: Common Brick Programmed Instruction: Bricklaying Vocational Training, Structural Clay Products Institute	Construct project #27, courses without mortar, Bricklaying Vocational Training.	Checking each students bond.
Basket Weave.	Demonstration. Programmed Instruction.	Tools: Straightedge. Materials: Common Brick. Programmed Instruction: Bricklaying Vocational Training, Structural Clay Products Institute.	Layout project #49, Bricklaying Vocational Training, Structural Clay Products Institute.	Checking each student's bond.

Task No. 21 (continued)

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Cutting brick.	Demonstration.	Tools: Brick. Hammer. Materials: Common Brick.	Cutting brick with a hammer and brick set.	Observe student's cutting brick.
Removing mushroomed head.	Discussion.	Tools: Hammer. Chisel. Brick Set, Materials: Common Brick.	Removing mushroomed heads from chisel and hammer.	Check tools.

OCCUPATIONAL INFORMATION UNIT FOR MASONRY

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
The employment outlook: 1. Local 2. National	Lecture. Discussion.	Publication: Occupational Outlook Report Series, Bulletin #1450-12, reprint from Occupational Outlook Handbook, U.S. Department of Labor, U.S. Government Printing Office, Washington, D.C., p. 5. Teacher-developed occupational information. Job outlook graph.	Visiting local employment offices to determine the local employment outlook. Participating in lecture-discussion. Written report of visits to employment office and construction site.	Reviewing student's reports on their visit to local employment offices and construction sites.
The wage scale: 1. Local a. union (1) apprentice (2) journeyman (3) master b. non-union (1) entry wages (2) experienced 2. National a. union (1) apprentice (2) journeyman (3) master b. non-union (1) entry wage (2) experienced	Field trip to masonry-construction sites. Discussion. Overhead projector.	Publication: Occupational Outlook Report Series, p. 10. National Bricklaying Apprenticeship Program and Standards, U.S. Department of Labor, Government Printing Office, Washington, D.C. Local and national wage graph material. Teacher-made aids showing the national outlook. Teacher-developed occupational information. Overhead projector.	Visiting the union building of bricklayers local #1 and #4 for personal interviews. Writing a report on the places visited. Viewing teacher-made aids on overhead projector. Participation in discussion: (1) non-union entry wage (2) experiences necessary for employment	Reviewing and checking student's reports. Reviewing and a discussion on the places visited. Checking and observing student participation in the discussion.
Types of training available: (1) Apprenticeship programs (2) Technical or trade schools (3) On-the-job (4) Military	Lecture. Supervised study. Field trip (to be planned) dependent upon the local area apprenticeships. Also, a visit to the shop by a consultant from the U.S. Department of Labor.	Teacher-developed occupational information. Teacher-made visuals. Agenda for the visiting consultant.	Using the library to look up information. Making field trips. Listening to lecture.	Checking student's notes on library information. Discussion on field trip.
The working conditions experienced.	Lecture. Discussion. Field trip to construction site.	Teacher-developed occupational information. Occupational Outlook Report Series #1450-12.	Listening to lecture. Writing reports on field trip.	Observing student's participation in lecture. Reviewing student reports.

OCCUPATIONAL INFORMATION UNIT FOR MASONRY (continued)

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
The physical and mental characteristics needed for qualifications for employment.	Overhead projector. Lecture.	Teacher-developed visuals showing physical and mental requirements. Overhead projector. Teacher-developed occupational information. Publication: Job Guide for Young Workers, U.S. Department of Labor, Government Printing Office, Washington, D.C., 1963-64 edition, p. 47.	Viewing teacher-made visuals and listening to the lecture. Making a list of physical and mental characteristics required for the occupation.	Observing student's participation in the lecture. Reviewing student list of physical and mental requirements.
The geographical location of employment.	Supervised discussion.	Publication: Occupational Outlook Report Series #1450-12, pp. 2,3.	Participating in discussion group.	Checking student's on their participation in discussion.
The opportunities for advancement.	Lecture. Flip chart Guest speaker from trade.	Teacher-developed occupational information.	Listening to lecture. Constructing a flip chart showing job advancement.	Observing student's participation in lecture. Check the student's chart.
The advantages and disadvantages of the occupation: 1. Advantages 2. Disadvantages	Lecture. Discussion.	Teacher-developed occupational information. Publication: Occupational Outlook Report, Series #1450-12, p. 7. Flip Chart material.	Listening to lecture. Participating in discussion. Interviewing a craftsman.	Observing student's participation in lecture. Reviewing student reports of interviews.
The nature of the work involved in the occupation.	Field trip to a brick-laying product.	Publication: Job Guide for Young Workers, U.S. Department of Labor, Government Printing Office, Washington, D.C., 1963-64 edition, p. 47. Teacher-developed occupational information.	Visiting a construction site.	Checking student's reports on the field trip.
The union involvement in the occupation.	Lecture. Discussion. Guest speaker from a union.	Teacher-developed occupational information.	Listening to the lecture and asking questions.	Checking student's notes from the lecture.

PAINTING

TASK NO. 1: PREPARING A SURFACE FOR APPLICATION OF STAIN ON THE INTERIOR OR EXTERIOR OF A HOUSE

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Setting nails with a hammer and nailset. Protecting oneself by wearing safety glasses. Demonstrating safe use of step ladder and an extension ladder.	Demonstration	Nail Set Hammer Step Ladder Extension Ladder	Setting nails with hammer being careful about holding nailset properly. Setting up and using step and extension ladders.	Observing student in proper use of nailset, hammer and ladders.
Removing hardware with a screwdriver prior to finishing. Using a screwdriver safely.	Demonstration	Hinges or Hardware Screwdriver Container for storage of hardware and screws.	Removing hardware from some type of material to be furnished. (Doors, cabinets, etc.)	Observing students in removal of hardware and their use of tools and proper storage of hardware.
Explaining the importance of grounding electric power tools, especially when in contact with the ground. Raising the grain of wood with water. Explaining the grades of sandpaper available. Explaining types of sanders available. Using a dust mask when sanding. Using various types of power sanders correctly. Sanding the surface by hand or machine to desired quality. Explaining how to check wood to see if it is ready for stain.	Lecture Demonstration	File Strip "The Story of Coated Abrasives," free from Manufacturers Institute, 711 3rd Avenue, New York 17, N.Y. Text, _Coloring, Finishing and Painting Wood_, pp. 29-45. Portable Belt Sander Speed Block Occilating Sander Dual Motion Sander Disc Sander Transparency on belt sander showing proper lubrication points.	Raise grain of wood with water and explain that water stains also tend to raise the grain. Sanding surface with portable bell sander and finish sanding with straight line motion on occilating sander. Students fill out a duplicated form showing proper lubrication points of a portable sander.	Test on abrasives Check competence in using portable electric tools.
Removing grease and oil stains with solvent and/or heat. Cleaning the surface of sanding dust with a cloth, vacuum cleaner or tack rag.	Demonstration	Various solvents for different types of material to be removed for use in the tack rag/	Make tack rag with turpentine and cloth and remove dust from sanded panel. Make a table showing solvents for thinning and removing finishes.	Quiz on various solvents for thinning or removing various finishes.
Explaining types of fillers available. Applying wood filler to defects or to open grained wood. Cleaning up the work area upon completion of the job.	Demonstration	Plastic Wood Water Putty Stick Shellac Paste Filler Turpentine or Stains _Coloring, Finishing and Painting Wood_, Bennett Publications, pp. 24-27.	Put stick shellac, plastic wood, or water putty in large defects. Mix filler in proper porportions with turpentine or stain and apply and remove from open grain woods.	Observation of proper use of materials.

TASK NO. 2: PREPARING A SURFACE FOR APPLICATION OF PAINT ON THE INTERIOR OR EXTERIOR OF A HOUSE

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading instructions on paint container pertaining to preparation of surface.	Lecture	Transparency of paint can instruction.	Make a list of most important factors concerning preparation of surface.	Check list made up by students.
Removing hardware with a screwdriver prior to finishing. Demonstrating safe use of a step ladder and extension ladder. Setting nails with a hammer Using a screwdriver safely Protecting oneself by wearing safety glasses.	Demonstration	Hinges or Hardware Screwdriver Container for storage of hardware and screws. Step Ladder Extension Ladder Hammer Nailset	Removing hardward from some type of material to be finished, (Doors, cabinets, etc). Using ladders safely. Setting nails and using nailset properly. Setting nails with hammer being careful about holding nailset properly.	Observing students in removal of hardware and their use of tools, ladders and proper storage of hardware. Observing student in proper use of nailset and hammer.
Removing loose paint with a wire brush. Removing loose paint with a scraper. Removing old finish by heat or chemical means. Explaining types of paint remover available. Protecting oneself by wearing gloves. Explaining how to handle chemicals safely. Removing grease, oil and wax with commercial cleaner.	Demonstration Lecture	Wire Brush Paint Scraper Blow Torch or Bernz-O-Matic Paint and Varnish Remover Painting and Decorating Encyclopedia, Goodheart-Wilcox, page 41, pp. 75-86.	Remove paint by using scraper, wire brush, heat, and paint remover.	Observation of students and checking finished preparation of surface.
Explaining types and grades of sandpaper available. Explaining types of sanding machines available. Explaining the importance of grounding electric tools, especially when in contact with the ground. Using a dust mask when sanding. Providing proper ventilation in the work area. Sanding a surface with a power sander or by hand to desired quality. Removing grease, oil and wax with commercial cleaners.	Lecture Demonstration	Film Strip, "Abrasives," free from Text, Coloring, Finishing and Painting Wood, pp. 29-45. Portable Belt Sander Speed block occilating sander Dual Motion Sander Disc Sander Transparency on Belt Sander showing proper lubrication points. Commercial cleaners and wax removers.	Sanding surface with portable bell sander and finish sanding with straight line motion on occilating sander. Students fill out a duplicated form showing proper lubrication points of a portable sander. Using commercial cleaners to remove waxes, grease and oil being careful of toxic fumes from some cleaners.	Test on abrasives and commercial cleaners. Check competency in using portable electric tools.

Task No. 2 (continued)

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Explaining types of filler available. Applying filler to level defects in the surface with a putty knife.	Demonstration	Plastic Wood Water Putty Stick Shellac Paste Filler Turpentine or Stains Coloring, Finishing and Painting Wood, Bennett Publication, pp. 24-27.	Put plastic wood, or water putty in large defect.	Observation of proper use of materials.
Applying a cleaning solvent to galvanized iron prior to painting with a brush. Applying an etching solution to concrete with a brush. Explaining recommended primers for various surfaces. Explaining clothing appropriate to use when working with chemicals.	Demonstration Lecture	Brush Etching Solution Cleaning Solvent Various Priming Materials.	Apply solvent to galvanized gutters or spouting and priming metal for painting.	Observation of proper application.
Applying a sealer with a brush to knots and materials which will "bleed." Explaining types of sealers available for plaster, drywall, new wood, knots. Applying preservative with a brush to wood in contact with moisture. Selecting solvents for various finishing materials. Cleaning up the work area upon completion of the job.	Lecture Demonstration	Shellac Sanding Sealer Drywall Primer Penta Wood Preservative Various Solvents	Sealing knots with shellac and applying preservative to wood being sure to explain that some preservatives cannot be painted over.	Quiz on various types of sealers used on different types of materials.

TASK NO. 3: PREPARING A SURFACE FOR APPLICATION OF A CLEAR FINISH ON THE INTERIOR OR EXTERIOR OF A HOUSE

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Setting nails with a hammer and nailset. Demonstrating safe use of step ladder and extension ladder. Protecting oneself by wearing safety glasses.	Demonstration	Nail Set Step Ladder Hammer Extension Ladder	Setting nails with hammer being careful about holding nailset properly. Setting up and using step and extension ladders.	Observing student in proper use of nailset, hammer and ladders.
Removing hardware with a screwdriver prior to finishing. Using a screwdriver safely.	Demonstration	Hinges or Hardware Screwdriver Container for storage of hardware and screws.	Removing hardware from some types of material to be finished (doors, cabinets, etc.).	Observing students in removal of hardware and their use of tools and proper storage of hardware.
Explaining the importance of grounding electric tools, especially when in contact with the ground. Explaining grades of sandpaper available. Raising the grain of the wood and water. Explaining types of sanders available. Using a dust mask when sanding. Using various types of power sanders correctly. Sanding the surface by hand or machine to desired quality.	Lecture Demonstration	Film Strip, "Abrasives," free. Text, Coloring, Finishing and Painting Wood, pp. 29-45. Portable Belt Sander Speed Block Occilating Sander Dual Motion Sander Disc Sander Transparency on belt sander showing proper lubrication points.	Raise grain of wood with water and explain that water stains also tend to raise the grain. Sanding surface with portable belt sander and finish sanding with straight line motion on occilating sander. Students fill out a duplicated form showing proper lubrication points of a portable sander.	Test on abrasives. Check competency in using portable electric tools.
Removing grease and oil stains with solvent and/or heat. Cleaning the surface of sanding dust with a cloth, vacuum cleaner or tack rag.	Demonstration	Various solvents for different types of material to be removed and for use in the tack rag.	Make tack rag with turpentine and cloth and remove dust from sanded panel. Make a table showing solvents for thinning and removing finishes.	Quiz on various solvents for thinning or removing various finishes.
Explaining types of filler available. Applying wood filler to defects or to open grain wood. Cleaning up the work area upon completion of the job.	Demonstration	Plastic Wood Water Putty Stick Shellac Paste Filler Turpentine or Stains Coloring, Finishing and Painting Wood, Bennett Publications, pp. 24-27.	Put stick shellac, plastic wood, or water putty in large defect. Mix filled in proper proportions with turpentine or stain and apply remove from open grain woods.	Observation of proper use of materials.
Inspecting surface to determine readiness for clear finish. Selecting a dust free location for applying finish.	Lecture Demonstration	Prepared Surface	Observing each piece of stock to determine if it is ready for finish.	Checking all stock for scratches, defects, etc.

TASK NO. 4: REMOVING OLD FINISHES IN PREPARATION FOR RESURFACING.

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading instructions for use of paint and varnish remover.	Lecture	Different types of paint and varnish remover.	Read labels and instructions for various types of paint remover.	Quiz on procedures for several types of paint removers.
Setting nails with a hammer and nailset. Demonstrating safe use of step ladder and extension ladder. Protecting oneself by wearing safety glasses.	Demonstration	Nail Set Step Ladder Hammer Extension Ladder	Setting nails with hammer being careful about holding nailset properly. Setting up and using step and extension ladders.	Observing student in proper use of nailset, hammer and ladders.
Removing hardware with a screwdriver. Using a screwdriver safely.	Demonstration	Hinges or Hardware Screwdriver Container for storage of hardware and screws.	Removing hardware from some type of material to be finished, (doors, cabinets, etc.)	Observing students in removal of hardware and their use of tools and proper storage of hardware.
Measuring and figuring square footage to determine the amount of paint and varnish remover required.	Lecture Demonstration	Chalkboard Chalk	Measure painted area and figure sq. ft. for purpose of determining amount of paint remover.	Check figures for each student and provide additional problems in figuring square feet
Explaining types of paint remover available. Protecting oneself from paint and varnish remover that is irritable to the skin. Protecting owner's property with drop cloths when using paint and varnish remover. Applying paint and varnish remover with a brush. Protecting oneself by wearing gloves.	Lecture Demonstration	Various types of paint remover. Rubber Gloves Vaseline for Hands Polyethelene Drop Cloth Brush Page 41, Goodheart-Willcox, _Painting Encyclopedia_.	Applying paint remover being careful to take all precautions against personal injury or property damage.	Observation
Removing paint and varnish remover with a scraper or putty knife. Removing paint and varnish remover with coarse steel wool on irregular surfaces.	Demonstration	Scrapers Putty Knife Steel Wool	Removing paint and varnish with putty knife, scraper and steel wool.	Check completed area to make sure that all finish has been removed.

Task No. 4 (continued)

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Explaining grades of sandpaper available. Explaining types of sanders available. Using various types of power sanders correctly. Sanding the surface by hand or machine to remove old finish. Explaining added precautions when using electric tools if operators in contact with the ground. Using a dust mask when sanding. Providing proper ventilation in the work area.	Lecture Demonstration	Film Strip, "Abrasives," free Coloring, Finishin and Painting Wood, pp. 29-45. Portable Belt Sanor Speed Block Occiliring Sander Dual Motion Sander Disc Sander Transparency on bet sander showing proper lubricationpoints.	Sanding surface with portable bell sander and finish sanding with straight line motion on occilating sander. Students fill out a duplicated form showing proper lubrication points of a portable sander.	Test on abrasives. Check competency in using portable electric tools.
Applying a solution to neutralize the paint and varnish remover if called for by manufacturer's instructions. Cleaning up the work area upon completion of the job.	Demonstration	Brush Neutralizing Soluton	Making a table or chart showing various neutralizers for various commercial paint and varnish removers.	Checking notebook. Summary test on removing old finishes.

TASK NO. 5: PREPARING STAINS AND APPLICATOR FOR USE ON THE INTERIOR AND EXTERIOR OF A HOUSE

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGISTED INSTRUCTIONL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading directions on container for application.	Lecture	Various types of stains	Reading directions on various cans and compare different types of applications. Preparing a general set of instructions for application of stain to be included in the student's notebook.	Oral quiz on various types of applications. Checking the student's notebook.
Explaining the various types of stains, their advantages and disadvantages. Explaining the solvents for types of stains on the market.	Lecture	Various types of stains Various types of solvents	Apply stains to pieces of scrap to determine effects of different types. Preparing a list of solvents for commercial stains.	Testing the student on knowledge of stains available and solvents available for use with them.
Removing lid of can with paint can opener. Protecting oneself by wearing safety glasses. Mixing stain with a stick prior to using. Mixing finishing materials with an electric drill. Thinning stain with solvent to make it lighter. Applying dry powder pigment to stain to make it darker. Using an electric drill safely. Explaining importance of grounding electric power tools, especially when in contact with ground. Preparing a clean brush or small pieces of clean cloth to apply stain. Providing proper ventilation in the work area. Cleaning up the work area upon completion of the job.	Demonstration	Paint Can Opener Stirring Stick Electric Drill Stain and Solvents Staining Pigments Brush Linseed Oil Putty Knife Cloth Coloring, Finishing and Painting Wood, Bennett Publications, pp. 110-133.	Open paint can with opener. Mixing and thinning various types of stains to obtain different effects on wood. Preparing a brush by soaking in linseed oil, removing loose bristles, cutting off stray bristles on edges of brush.	Observation

TASK NO. 6: PREPARING PAINT APPLICATORS FOR USE IN PAINTING A HOUSE

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading instructions for the preparation of paint.	Lecture Overhead Projector	Visuals made from the labels of various paint cans. Overhead Projector	Making a list of the vital points to be found on a label such as solvent, drying time, coverage and preparation.	Checking the student notebook.
Explaining proper thinners for various paints on the market. Removing lid of can with paint can opener. Preparing paint by mixing on a mechanical mixer. Mixing finishing materials with an electric drill. Using an electric drill safely. Explaining added precautions when using electric tools, especially when in contact with ground. Preparing paint by stirring it. Preparing paint by boxing it. Providing proper ventilation in the work area. Preparing paint for application by thinning according to manufacturer's instructions. Protecting oneself by wearing safety glasses.	Lecture Demonstration	Paint Samples or labels from can and thinners prescribed. Paint Mechanical Shaker or Mixer (if available) Electric Drill Perforated Stirring Stick (Metal) Thinning Materials *Coloring, Finishing and Painting Wood*, Bennett Publications, pp. 303-374.	Making up a list of thinners for various paints. Preparing paint by mixing with proper thinners, stirring, shaking and boxing.	Test on types of thinners used for various materials. Checking results of student's work on various types of preparation.
Selecting proper width of brush according to area to be covered. Selecting proper width of roller for area to be painted. Selecting proper texture roller for desired finish.	Lecture Demonstration	Assortment of Brushes and Rollers of various sizes and types.	Making a list of various sizes of brushes and textures of rollers along with the locations where their use would be most suitable.	Quiz on uses of different rollers and brushes for different types of finishes and varying locations.
Cleaning a brush by shaking out solvent and wiping it dry. Cleaning up the work area upon completion of the job.	Demonstration	Brushes Solvents Rags, Etc.	Cleaning a brush at least one time during the course.	Check brush to make sure it has been properly cleaned.

TASK NO. 7: PREPARING CLEAR FINISHES AND APPLICATORS FOR USE ON THE INTERIOR AND EXTERIOR OF A HOUSE

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading directions on can for mixing and thinning.	Lecture Overhead Projector	Visuals made from the labels of various finishes. Overhead Projector	Making a list of the vital points to be found on a label such as solvent, drying time, coverage and preparation.	Checking the student notebook.
Protecting oneself by wearing safety glasses. Removing lid of can with a paint can opener. Explaining thinners for various finishes. Thinning finishing material with proper solvent. Stirring clear finishes before application. Providing proper ventilation in the work area. Cleaning up the work area upon completion of the job.	Lecture Demonstration	Information sheet describing solvents for various finishes. Shellacs Varnishes Laquers Alcohol Turpentine Lacquer Thinners	Making a table showing thinners for clear finishes.	Test on thinners for various finishes.
Selecting proper applicator for a job according to size of job and finish desired.	Lecture Demonstration	Assortment of various sizes and types of brushes and rollers.	Making a list of various sizes of brushes and textures of rollers along with the locations where their use would be most suitable.	Quiz on uses of different rollers and brushes for different types of finishes and varying locations.
Cleaning an applicator prior to use with a vacuum cleaner.	Demonstration	Brushes Rollers Vacuum Cleaner	Clean applicator with vacuum cleaner.	Check applicator.
Explaining finishes that are suitable for indoor or outdoor use.	Lecture		Student makes a list of clear finishes and where they are applicable.	Quiz on differences between regular and spar varnishes and other exterior finishes.

TASK NO. 8: CLEANING AND STORING BRUSHES, ROLLERS, AND PAINT CANS FOLLOWING THEIR USE IN APPLYING FINISHING MATERIALS

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading instructions on can of finish to determine proper solvent.	Lecture Overhead Projector	Visuals made from the labels of various finishes. Overhead Projector	Making a list of the solvents required for various finishes.	Checking the student's notebook. Testing the student on solvent required for various finishes.
Protecting oneself by wearing gloves and safety glasses. Cleaning rim of container free of finishing material. Sealing lid of can with a hammer.	Demonstration	Paint Container Absorbing Cloth Cover Cloth Hammer	Cleaning rim of paint can to insure proper sealing and resealing. Sealing can using cover cloth over can.	Observation.
Explaining types of preparations available for cleaning hard brushes. Softening hardened bristles with commercial preparation. Cleaning hard paint from bristles near ferrule with a wire brush.	Demonstration Lecture	Brush Cleaner Wire Brush	Preparing mixtures or using ready mixed cleaner and putting brushes to soak in containers and cleaning bristles with wire brush on brushes that have been previously soaked.	Check cleanliness of brushes.
Washing brush or roller in thinner. Providing proper ventilation in the work area. Removing excess thinner from brush or roller by working it out on scrap wood or paper or by "whipping" it out. Washing thinner from brush or roller with soap and water. Demonstrating how to store wet brushes. Storing brushes wrapped in paper to keep the bristles straight. Cleaning up the work area upon completion of the job.	Demonstration Lecture	Paint Brushes Rollers Containers Various Solvents Rags and Papers	Cleaning of brushes and rollers and proper storage of them after cleaning.	Check cleanliness of brushes.

TASK NO. 9: GLAZING A WINDOW IN PREPARATION FOR PAINTING

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Explaining importance of grounding electric power tools especially when in contact with ground. Protecting oneself by wearing: a. Safety Glasses b. Safety Helmet c. Gloves Demonstrating safe use of step ladder and extension ladder. Removing putty with a putty softener and a putty knife. Explaining safe use of putty. Removing glazing points with a putty knife. Removing glass from opening with hammer, pliers, and chisel. Removing backing putty from sash with a putty knife.	Lecture Demonstration	Putty Softener Extension Cord Putty Knife Gloves Step Ladder r Extension Ladd , Painting Goodheart-Willco , 138-139. Encyclopedia, p	Placing putty softener on putty for necessary time and remove putty, glazing points and broken glass from sash being sure to take safety precautions for handling glass.	Check window for proper cleaning. Make sure bed putty points are removed properly.
Removing lid of can with a paint can opener. Preparing glazing compound by kneading in the hand. Applying glazing compound to sash by hand to bed glass in.	Demonstration	Glazing Compoun d	Take a small quantity of compound and knead it until it is ready for application. Apply putty to sash.	Check application of putty to the sash.
Measuring the size of an opening with a ruler accurate to the nearest 1/16 of an inch. Measuring the thickness of glass with a ruler accurate to the nearest 1/32 of an inch. Explaining thickness of glass obtainable.	Lecture Demonstration	6' Folding Rule with extension and or Metal Tape Window Sash	Measuring glass opening with a rule to determine size of glass to cut or buy. Making a list of available glass thicknesses along with the name of each thickness and where it is logically used.	Check accuracy of measurement to 1/16 of an inch. Check the student's notebook.
Installing glass in the opening and bedding it in the glazing compound. Installing glazing points with a hammer. Glazing the window with a putty knife. Removing surplus putty from around the glass. Cleaning hands and tools following installation of glass. Cleaning up work area upon completion of the job.	Demonstration	Glass Putty Knife nd Putty or Compour clips Glazing points c Solvent Hammer ing points Driver for glazi	Applying bedding compound to sash and inserting glass in sash. Securing glass with glazing points in a wood sash or metal clips in a metal sash. Glazing window and removing excess putty.	Check neat appearance upon completion of glazing operation. Testing students on the main and important steps in glazing a window.

TASK NO. 10: PREPARING JOINTER AND NAIL HOLES IN DRYWALL CONSTRUCTION TO RECEIVE FINAL FINISH

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading directions in order to mix cement properly.	Lecture Overhead Projector	Overhead Projector Visual stressing main points of mixing cement.	Making a listing of the most important steps in mixing joint compound.	Checking the student's notebook.
Protecting oneself by wearing safetv glasses. Countersinking any nail heads that stick above the paper with a round and hammer. Demonstrating safe use of a step ladder. Applying layer of cement in joint with a broad putty knife. Applying perforated tape in the cement with a broad putty knife. Covering nail heads with cement using a broad blade putty knife.	Demonstration	Hammer or Drywall Hatchet Ringlock Nails Hawk Step Ladder Drywall Joint Compound Perforated Tape Tape Creaser 4" Taping Knife Mud Pan Goodheart-Wilcox, Painting Encyclopedia, pp. 78-80.	Countersinking nails during the installation of the drywall being careful not to break the paper. Applying joint cement to joints and nail heads. Creasing tape and applying to corners.	Check nail patterns and make sure that all nails are set below the surface. Quiz on material to be used on all three coats and terms used such as taping, speckling, feathering edges, etc.
Applying a layer of cement over the tape and nails with a curved trowel. Explaining special purpose trowels available.	Demonstration Lecture	6" Knife for nail holes 12" or 14" Trowel for joints Mud Pan Saw Horse or Scaffolding Corner Trowel	Applying joint cement over tape and nails with wide putty knife, curved trowel and corner trowel.	Check for smoothness and feathering edges.
Applying topping compound to nail head with 6" knife. Applying topping compound to joint with a curved trowel.	Demonstration	6" Knife for nail holes 12" or 14" Trowel for joints Mud Pan Hawk Corner Trowel	Applying finish topping compound to joints and nails being sure to feather all edges and create a smooth surface that will require minimum sanding.	Check corners and joints for feathered edges and smoothness.
Explaining grades of sandpaper available. Sanding the nail heads and joints when compound is dry with an orbital sander and by hand. Using a dust mask when sanding. Explaining the importance of grounding electric tools. Cleaning up the work area upon completion of the job.	Demonstration	Sandpaper Speed Block Sander Sanding Blocks Dust Mask	Selecting proper sandpaper and sanding joints and nail heads to give finished appearance to the surface.	Check for final finish. Test students on most important steps in preparing joints and nail holes in drywall construction to receive final finish

TASK NO. 11: APPLYING FINISHING MATERIALS TO PROVIDE PROTECTION AND DECORATION TO SURFACES IN OR ON A HOUSE

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading written instructions pertinent to application of finish.	Lecture Overhead Projector	Overhead Projector Visuals of paint can instructions	Listing in notebook the important points to remember in preparation of a surface for paint and application of the finish.	Checking student notebooks.
Measuring dimensions of objects to be painted with a ruler. Multiplying to figure sq. ft. area of surface to be painted. Dividing to find quantity of finish needed to cover area to be painted.	Lecture Overhead Projector	Overhead Projector Visuals showing various areas to be painted. Chalkboard Chalk 6' Folding Rule or Tape Rule	Figuring areas as outlined in a handout sheet and then calculating the amount of paint needed using information from the paint table.	Checking results of student calculation on handout sheets.
Removing hardware with a screwdriver prior to painting.	Demonstration	Screwdriver Container for parts and hardware	Removing and replacing hardware such as door locks and hinges.	Observation.
Selecting solvents for various finishing material	Lecture Overhead Projector	Overhead Projector Visual showing finishes and solvents	Reviewing work in notebook to see that information on solvents is complete.	Final test on knowledge of solvents for finishing materials.
Explaining use of primers on new work. Explaining importance if using step by step procedure in painting. Explaining effect of humidity and temperature level on drying time. Providing proper ventilation for safe work conditions.	Lecture Overhead Projector	Overhead Projector Visual showing effect of primer as compared to a finish paint when applied to bare-wood. Visual of step by step procedure in painting.	Listing most important features in a step by step procedure for applying finishing materials.	Test on procedures of painting effects of humidity, etc. Check student notebooks.
Protecting surfaces not to be painted with a drop cloth. Demonstrating safe use of a step ladder and an extension ladder. Protecting oneself by wearing: a. Safety Glasses b. Safety Helmets c. Gloves Applying finishing materials with a brush. Applying finishing materials with a roller. Cleaning up the work area upon completion of the job.	Demonstration	Paint Brush Roller Pan Stirring Stick Step Ladder Extension Ladder Drop Cloth Solvents Wiping Cloth	Applying finishes to prepared surfaces by means of brush and roller. Protecting surfaces not to be painted. Cleaning up the work area properly.	Observation

OCCUPATIONAL INFORMATION UNIT FOR PAINTING

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
The employment outlook 1. Local 2. National	Lecture. Guest speaker. (Employment Security)	Publications: Occupational Outlook Handbook, U.S. Department of Labor, 1966-67 edition, Washington, D.C.: Government Printing Office, 1966, p. 405. Painter and Decorator, Painter & Decorator, Painter & Decorators Building, Lafayette, Indiana. Teacher-developed occupational information.	Visiting local painters and painting contractors to determine the local employment outlook.	Reviewing the reports of student's visit to local employers.
The wage scale 1. Local a. Union (1) apprentice (2) journeyman (3) master b. Non-union (1) entry wages (2) experienced 2. National a. Union (1) apprentice (2) journeyman (3) master b. Non-union (1) entry wages (2) experienced	Lecture. Overhead projector.	Publications: Occupational Outlook Handbook, U.S. Department of Labor, 1966-67 edition, Washington, D.C.: Government Printing Office, 1966, p. 405. "Opportunity in the Painting, Decorating and Coating Trade," from Brotherhood of Painters, Decorators and Paperhangers of America, 1925 K Street, N.W., Washington, D.C. 20006.	Visiting local employers and union offices to collect information concerning wage scales. Listing information on the national level found in the Occupational Outlook Handbook.	Reviewing the report of student's visit to local employers and union offices.
The types of training available 1. Apprenticeship programs 2. Technical or trade schools 3. On-the-job 4. Military	Lecture. Use expert in the field as guest speaker and resource person.	Publications: "Opportunity in the Painting, Decorating and Coating Trade," from Brotherhood of Painters, Decorators and Paperhangers of America, 1925 K Street, N.W., Washington, D.C. 20006. Painter and Decorator, Painters & Decorators Building, Lafayette, Indiana. Occupational Outlook Handbook, U.S. Department of Labor, 1966-67 edition, Washington, D.C.: Government Printing Office, 1966 "Selected Apprenticeship Schedules from the Building and Construction Trades, U.S. Department of Labor, Bureau of Apprentice & Training, Washington, D.C.: Government Printing Office, pp. 77-80. Teacher-developed occupational information. Brochures or courses of study from technical, trade, and military programs.	Visiting an apprentice training school or a technical or trade school. Writing requirements for admission to a technical or trade school. Interviewing a painting contractor concerning on-the-job training.	Reviewing student reports of visitations and interviews

OCCUPATIONAL INFORMATION UNIT FOR PAINTING (continued)

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
The working conditions experienced in the occupation.	Lecture. Guest speaker.	Publications: "Opportunity in the Painting, Decorating and Coating Trade," from Brotherhood of Painters, Decorators and Paperhangers of America, 1965 K Street, N.W., Washington, D.C. 20006. Occupational Outlook Handbook, U.S. Department of Labor, 1966-67 edition, Washington, D.C.: Government Printing Office, 1964, p. 405. Teacher-developed occupational information.	Visiting a job site. Making a list of the working conditions experience in the occupation using the Occupational Outlook Handbook and "Opportunity in the Painting, Decorating and Coating Trade."	Checking student's list of working conditions.
The physical and mental characteristics needed for qualification for employment.	Lecture. Guest speaker.	"Opportunity in the Painting, Decorating and Coating Trade, from Brotherhood of Painters, Decorators and Paperhangers of America, 1965 K Street, N.W., Washington, D.C. 20006. Occupational Outlook Handbook, U.S. Department of Labor, 1966-67 edition, Washington, D.C.: Government Printing Office, 1964, p. 404. Teacher-developed occupational information.	Interviewing a tradesman concerning physical and mental characteristics needed for employment.	Reviewing the student reports that were written as a result of interviews.
The geographical location of employment.	Lecture. Overhead projector.	Publications: Painter and Decorator, Painters & Decorators Building, Layfayette, Indiana. Spotlight, Painting & Decorating Contractors of America, Chicago, Ill. American Painting Contractor, 2911 Washington Avenue, St. Louis, Missouri, 3103. Teacher-made visuals showing the favorable geographic locations of employment. Teacher-developed occupational information.	Visiting an employment security office to determine the local employment opportunities. Writing to an employment security office in a large population area to determine what the opportunities for employment are there.	Reviewing information gathered by students concerning the geographical location of employment.
The opportunity for advancement.	Lecture. Guest speaker.	Publications: Occupational Outlook Handbook, U.S. Department of Labor, 1966-67 edition, Washington, D.C.: Government Printing Office, 1964, p. 404. "Opportunity in the Painting, Decorating and Coating Trade," from Brotherhood of Painters, Decorators and Paperhangers of America, 1965 K Street, N.W., Washington, D.C. 20006.	Interviewing a painting contractor concerning the opportunities for advancement.	Checking the student notebook for information on opportunities for advancement.

OCCUPATIONAL INFORMATION UNIT FOR PAINTING (continued)

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
The advantage and disadvantage of the occupation 1. Advantages 2. Disadvantages	Lecture. Guest speaker.	Publications: Occupational Outlook Handbook, U.S. Department of Labor, 1966-67 edition, Washington, D.C.: Government Printing Office, 1964, p. 403. "Opportunity in the Painting, Decorating and Coating Trade," from Brotherhood of Painters, Decorators and Paperhangers of America, 1965 K Street, N.W., Washington, D.C. 20006. Teacher-developed occupational information.	Writing a list of advantages and disadvantages to be included in a notebook.	Reviewing information in the student notebooks on the advantages and disadvantages of the occupation.
The nature of the work involved in the occupation.	Lecture. Guest speaker.	Publications: Occupational Outlook Handbook, U.S. Department of Labor, 1966-67 edition, Washington, D.C.: Government Printing Office, 1964, p. 403. "Opportunity in the Painting, Decorating and Coating Trade," from Brotherhood of Painters, Decorators and Paperhangers of America, 1965 K Street, N.W., Washington, D.C. Teacher-developed occupational information.	Visiting job sites to see the types of work done by painters.	Reviewing student reports of field trips.
The unions involvement in the occupation.	Lecture. Guest speaker.	Publication: "Opportunity in the Painting, Decorating and Coating Trade," from Brotherhood of Painters, Decorators and Paperhangers of America, 1965 K Street, N.W., Washington, D.C. Teacher-developed occupational information.	Visiting a union office and talking with union officials as well as with apprentices and journeymen.	Reading student reports which result from talking with union officials, apprentices and journeymen concerning union involvement in the occupation.

PLUMBING

TASK NO. 1: DIGGING A TRENCH FOR PLUMBING INSTALLATION IN A HOUSE

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading a blueprint to determine depth to trench and grade of bottom.	Lecture. Demonstration.	Plot plans showing position of sturcture on plot in relation to streets, sewer line, water and gas mains.	Have students determine most logical places to dig trench for water lines and sewer lines.	Check student work sheets to determine if careful appraisal has been made.
Measuring grade of trench bottom with a level and rule accurate to 1/4 of an inch in 8 feet.	Lecture. Demonstration. Problem Solving.	Pencil, paper, rules, level.	Using an already established trench, let students check to determine if proper grade has been established.	Observe students using level to determine if they are using proper techniques.
Figuring the total grade for any distance when given the grade per foot.	Lecture. Problem solving.	Pencil, paper, work sheets with problems to be solved relating to grade per foot.	Students solve problems on work sheet to become familiar with figuring total grade per foot is given.	Check student answer sheets to determine if problems have been solved properly.
Saving lawn sod from area of excavation by removing it with a shovel. Loosening sod with a pick prior to removal from the trench. Removing soil from trench with a shovel. Leveling bottom of trench to determine proper grade with a level and rule to 1/4 of an inch in 8 feet.	Lecture. Demonstration.	Picks, shovels, level, chalkline, stakes, rule, sod cutter, wheelbarrow.	Layout out location of trench with chalkline and stakes. Carefully remove sod (is sod is present) by using sod cutter and shovel. Roll sod carefully to keep drying out to a minimum. Working in pairs have students dig an 8 ft. trench, 3 ft. deep and establish a grade of 1/4 inch in 8 feet.	Check to determine if sod has been properly stored to keep drying to a minimum. Check trench for correct measurements and grade.
Working at a moderate rate of speed. Preserving the removed sod so it can be used to recover the excavated area. Placing excavated soil in position to make backfilling easy. Protecting oneself by wearing: a. Safety shoes. b. Safety helmets. c. Gloves.	Lecture. Demonstration.	(Note) This area of information can best be covered by lecture in regards to correct work habits and proper use of body in using a pick and shovel and using safety devices.	Student in the course of digging trench will display correct way to use body when working with a pick and shovel. Demonstrate proper way to roll sod to keep it from drying out. Students will show value of having excavated dirt close to trench, but still for enough bach that as dirt pile gets larger it will not fall bach into excavated trench. Students will show by demonstration how safety shoes, safety helmets and gloves are for their comfort and protection.	Observation of students executing proper work techniques in using pick and shovel and observing safe work habits.

TASK NO. 3: BACKFILLING A TRENCH FOLLOWING INSTALLATION OF PLUMBING LINES

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Covering lines with fine dirt with a shovel to protect them from stones. Packing loose dirt in trench with a tamper. Compacting earth with water. Replacing sod on top of fill. Cleaning up lawn areas with a rake. Wetting down replaced sod with a hose.	Lecture. Demonstration.	Shovels, picks, earth tamper, garden hose, rakes.	Students will check newly installed plumbing installation to determine if work has been properly done. Check for leaks if it is a gas line or water line. Students will then proceed to fill trench, first with fine dirt so that it will properly bed around line then with the course porous material. Carefully tamp earth in place as fill is being made. Have student water down dirt to aid in tamping. Replace sod, water down and then tamp sod in place. Use rakes to clean up area.	Observe students employing correct work habits. Check as fill is being made that dirt is being tamped in place. Observe that care is being taken to properly replace sod. Inspect area after job is completed that all material is properly handled. Inspect all tools to determine if they have been properly cleaned and stored.
Working at a moderate rate of speed. Protecting oneself by wearing: a. Safety shoes. b. Gloves.	Lecture. Demonstration.	(Note) This area of information can best be covered by lecture in regards to correct work habits and proper use of body in using a pick and shovel and using safety devices.	Student in the course of digging trench will display correct way to use body when working with a pick and shovel.	Observation of students executing proper working techniques in using pick and shovel and observing safe work habits.

TASK NO 3: PREPARING COPPER TUBING FOR INSTALLATION IN A PLUMBING SYSTEM FOR A HOUSE

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading a blueprint to determine length and diameter of tubing required.	Lecture. Demonstration. Film.	Blueprint of plumbing installations using copper tubing. Textbook: The Plumbing and Fitting Industry, issued by Shelby M. Jackson, State Superintendent of Education, Louisiana, unit III. Overlay for overhead projector showing allowances to be made for fittings in a tubing installation. Answer or fill in sheets for students to record measurements taken from blueprints. Assorted fittings used in assembling tubing. Film: "Copper Tube in Building Construction," 16MM, Revere Copper and Brass, Inc., 230 Park Avenue, New York 17, N.Y.	Student read blueprints in class and fill in dimensions of tubing needed on the answer sheet provided. Students make sketches of allowances necessary for fittings used with common size of copper tubing. The sketches should become part of the student's notebook.	Check the answer sheet of each student. Check the student's notebook for sketches of fitting allowance.
Measuring tubing to length with a ruler to an accuracy of 1/8 of an inch.	Lecture. Demonstration.	Rulers. Assorted lengths of tubing, color-coated for identification. Answer sheets keyed to color-coated tubing samples. Instruction sheets calling for varying lengths of tubing to be cut from stock sizes.	Measuring color coded tubing samples and recording answers. Mathematical computation to determine economical use of stock sizes of tubing. Student records his findings in place provided on instruction sheet.	Check student work sheets.
Holding tubing with a vise for cutting and reaming.	Demonstration.	Pipe vise. Improvised wood block vise.	Students construct blocks for holding various sizes of tubing. Possible take home item.	Check student-constructed blocks.
Cutting tubing to length with a hacksaw or tubing cutter to an accuracy of 1/8 of an inch. Reaming copper tubing with a reamer. Cutting tubing square in order to make good joints.	Demonstration. Film.	Tubing cutter. Wood block tubing holder or pipe vise. Hacksaw with 32 TPI blade. Reamer. Film: "Don't Build Hazard into Your Tubing System," 16 MM, Manager of Marketing Service, Imperial Brass Manufacturing Company, 6300 West Howard Street, Chicago 48, Ill.	Cutting tubing to specified length with hacksaw and tubing cutter. Reaming tubing which is cut.	Measure student work for accuracy. Check student work for proper reaming and squareness of cut.
Cleaning tubing preparatory to installation with a cloth and steel wool or emery cloth. Cleaning metals properly to make soldering easy.	Demonstration. Film.	Steel wool. Emery cloth. Wiping cloth. Film: "Better Water Systems with Copper Tube," 35 MM Strip film, National Assoc. of Plumbing, Heating, Cooling Contractors, 1016 20th Street, N.W., Washington, D.C. 20036.	Cleaning tubing in preparation for soldering.	Check student work.

TASK NO. 4: PREPARING THREADED PIPE FOR INSTALLATION IN A PLUMBING OR GAS SUPPLY SYSTEM IN A HOUSE

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading a blueprint to determine: a. Location of point pipe is to be installed. b. Length and diameter.	Lecture. Demonstration with overhead projector.	Blueprints of bathrooms and kitchen installations. Overlays for overhead projectors showing locations of pipe in bathroom showing locations of gas line for kitchen. Overlays showing different types of pipe fittings.	Students read blueprints of kitchens and bathrooms and make up bill of materials of acutal sizes and diameters of pipes. Students make sketches of allowances necessary for fittings used with common sizes of threaded pipe installation. The sketches should become a part of the student's notebook. Make up list of different types of pipe fittings such as tee, ell, sleeves, etc.	Check bill of material against master list to determine if all required pieces were listed. Check notebook to determine if all required information has been listed.
Measuring a piece of pipe to length with a ruler to an accuracy of 1/8 of an inch. Adding, subtracting, multiplying, dividing in order to economically cut stock to correct length.	Lecture. Demonstration. Film.	Rulers. Assorted lengths of pipe. Color added for identification. Answer sheets, keyed to color coated pipe samples. Film: "Measuring Pipe, Tube, and Fitting," 16 MM, b&w, 15 mins., National Assoc. of Plumbing, Heating, Cooling Contractors, 1016 20th Street, N.W., Washington, D.C. 20036. Instruction sheets calling for varying lengths of pipe to be cut from stock pipe.	Measuring color coded pipe samples and record answers. Mathematical computation to determine economical use of stock sizes of pipe. Student records his finding in place provided on instruction sheets.	Observation of student making measurements. Check student notebook and worksheets.
Explaining the importance of grounding electrical equipment.	Lecture. Demonstration.	Adapter plugs for connecting 2-wire system to 3-wire system. Parallel ground rubber handle caps. Parallel ground rubber connector. Parallel ground duplex receptacle 3 ft. length 5/8" diameter iron rod. Cable clamps.	Have students make survey of shop and determine if all power tools are properly grounded. Make up extension cord with ground using parallel ground rubber handle cap and parallel ground rubber connector. Using 3 ft. iron rod and cable clamp, ground hand electric drill.	Check survey sheets to determine if students have made complete survey. Examine extension cord to determine if all connections have been made properly. Check improvised grounding exercise, then disassemble.

Task No. 4 (continued)

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Holding pipe in a vise for cutting, reaming and threading. Cutting pipe to length with hand cutter, hacksaw, and machine to an accuracy of 1/16 of an inch. Reaming pipe to remove burr by hand and machine. Cutting pipe thread with hand die. Cutting pipe thread with power machine. Changing die sizes on hand and power thread cutters. Using cutting oil for cutting and threading pipe. Cleaning pipe prior to installing by knocking out chips and wiping with a cloth.	Lecture. Demonstration. Film.	Length of pipe, pipe vise, rule, pipe cutter, reamer, pipe threader, cutting oil, pair 14" pipe wrenches, hacksaw, wiping cloth. Pipe fittings, tee, ell, 45° sleeve. Textbook: Plumbing, 3rd edition, Harold E. Babbitt, McGraw-Hill Publishing Company, pp. 168-170; 563-565 (tables). Film: "Cutting and Threading Pipe on Power Machines," 16 MM, b&w, 17 mins., National Assoc. of Plumbing, Heating, Cooling Contractors, 1016 20th Street, N.W., Washington, D.C. 20036. Cutting and threading pipe by hand.	Students use flexible 6 ft. rule and measure pipe as per instruction sheet. Cut pipe to an accuracy of 1/16 of an inch. Use hand reamer to remove burr from inner wall of pipe caused by pipe cutter. Change die size on hand die to correspond to diameter of pipe to be threaded. Cut pipe thread on pipe using techniques shown in film (use cutting oil). Carefully back off hand die from newly cut thread, wipe thread clean with wiping cloth and knock any chips from end of pipe. Run pipe fitting on newly cut thread to determine if threads have been carefully cut. Study table 11 - 43, p. 565 in Plumbing textbook and make simple table to be placed in student's notebook showing fractional parts of inches fitting and pipe can be made hand tight - Example: 3/8" .240 or approximately 1/4". Include in table the following sizes - 3/8", 1/2", 3/4", 1", 1 1/4", 1 1/2", 2", 2 1/2" and 3".	Observation of student while performing the task of cutting, reaming, adjusting die, cutting thread, cleaning pipe and finally running fitting on thread hand tight. Check distance fitting was threaded on end (hand tight) to see how it compares with table 11 - 43, p. 565, Plumbing text. Check student's table.
Cutting pipe square in order to make good joints. Cutting thread proper length. Cleaning and cutting, reaming, and threading tools with a cloth. Explaining added precautions when using electric tools if operator is in contact with ground. Protecting oneself by wearing: a. Safety glasses. b. Safety shoes. c. Gloves	Lecture. Demonstration.	Hacksaw, short lengths of various diameter pipe, wiping cloth, safety goggles, and gloves. Refer back science activity in regards to proper grounding electric tools. Textbook: Plumbing, 3rd edition, Harold E. Babbitt, McGraw-Hill Publishing Company, p. 565, table 11-43.	Permit students to cut short lengths of pipe with hand hacksaw. Students will make table of effective thread external for the following most commonly used size pipe in plumbing installations - 3/8", 1/2", 1", 1 1/4", 1 1/2", 2", 2 1/2" and 3". This table is to be part of student's notebook. Have students clean all tools emphasizing importance of cleaning all pipe cutting chips from pipe die.	Observe and check student as he is cutting short lengths of pipe with hacksaw to determine if cuts are being made square. Check student tables for accuracy. Examine all tools to determine if they have been cleaned properly and completely.

TASK NO. 5: PREPARING CAST IRON SOIL PIPE FOR POURING OF LEAD JOINT

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading a blueprint to determine length of pipe.	Lecture. Demonstration. Film.	Blueprints of bathrooms. Overlays for overhead projector. Showing soil pipe system. Overlays showing different types soil pipe fittings. Film: "A Better Way," National Assoc. of Plumbing, Heating, Cooling Contractors, 1016 20th Street, N.W., Washington, D.C. 20036. Textbook: Plumbing, 3rd edition, Harold E. BABBITT, McGraw-Hill Publishing Company, p. 270.	Students read blueprints of bathrooms and make up bill of material of all cast iron soil pipe needed including different types and sizes fittings required. Prepare plumber's vocabulary word list such as roughing in, calked, yarned, etc.	Check bill of material against master list. Check notebook to determine completeness of "plumber's vocabulary" to this point.
Measuring length of pipe with a ruler to an accuracy of 1/8 of an inch. Measure total length of cast iron pipe and fittings to an accuracy of 1/8 of an inch. Adding, subtracting, multiplying, dividing in order to economically cut stock to correct lengths.	Lecture. Demonstration.	Rulers. Several lengths of cast iron. Soil pipe. Collection of soil pipe fittings. Textbook: Plumbing and Pipe Fitting Industry, Issued by Shelby M. Jackson, State Superintendent of Education, State of Louisiana, 1953, unit III, R.S.A. No. 3, unit IV, R.S.A. No. 6. Hand out sheets with tables showing dimensions of cast iron soil pipe and of different cast iron fittings.	Assemble on floor several lengths of soil pipe using single and double "y"'s 1/4 bends, 1/8 bends, single and double sanitary "T"'s. Measure, assemble and record. Using tables in unit III, record dimensions of various pieces of soil pipe and fittings as they had been laid out on floor. Both results should be the same. Add new plumbing terms to vocabulary list.	Observation of students making measurement. Check worksheet for accuracy of paper assembly. Check notebook to see that students records are kept to date.
Cutting cast iron pipe to length with a cutting tool to an accuracy of 1/8 of an inch. Cutting cast iron pipe to length with a hammer and cold chisel to an accuracy of 1/8 of an inch. Preparing oakum for packing a joint. Positioning pipe in preparation for yarning. Yarning oakum in the joint with a hammer and yarning iron. Maintaining alignment of pipe while yarning the joint. Placing pipe in a vertical position for pouring lead. Attaching an asbestos gasket to soil pipe in order to pour the joint in a horizontal position.	Lecture. Demonstration. Film.	Rules, cutting tool, hammer, 3/4 " cold chisel, oakum, yarning iron, asbestos gasket. Film: "Once and Forever," National Assoc. of Plumbing, Heating, Cooling Contractors, 1016 20th Street, N.W., Washington, D.C. 20036 (16 MM color, sound, 14 mins. Textbook: The Plumbing and Pipe Fitting Industry, Issued by Shelby M. Jackson, State Superintendent of Education, State of Louisiana, units II, III, IV, V; unit III R.S.A. No. 3; unit IV R.S.A. No. 6. Plumbing, 3rd edition, Harold E. BABBITT, McGraw-Hill Publishing Company, pp. 164-167.	Arrange class in groups so that all members will have an opportunity to perform a function in completing the task. Each group will rotate from activity to activity until they have performed all the skills necessary for the task. Groups: a. Cutting a very short length of cast iron soil pipe with cutters. b. Cutting a very short length of cast iron soil pipe with hammer and cold chisel. c. Making a joint by preparing oakum, positioning the pipe, yarning oakum in joint using yarning iron and hammer. Build bracing to keep pipe in proper alignment and fasten asbestos gasket to soil pipe for horizontal pouring. Note: If class is large it may be necessary to have class broken into several groups of three. This will require a larger inventory of tools and material. Have students read the two assigned texts on pages indicated to answer questions on "hand out question sheet." Add additional plumbing terminology to word list.	Observation of students performing activities and oral questioning while activity is being performed. Check answer sheets for correct answer. Inspect notebook and check on vocabulary lists.

Task No. 5 (continued)

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Removing mushroomed heads from chisels and yarning irons with grinder. Protecting oneself by wearing: a. Safety glasses. b. Safety shoes. c. Gloves.	Lecture. Demonstration.	Collection of cold chisels, yarning irons, star drills, center punches and drifts. Grinder, safety shoes.	Have students examine collection of chisels, drills, etc., and note the condition of each tool examined. Permit students to grind these tools so that all will be free of mushroomed heads. Have students bring chisels, drills, etc. from home and let them resotre heads to a safe and serviceable condition. Have students examine pair of safety shoes and note area of foot provided with protection.	Observation of students performing task of grinding mushroomed heads from tools. Note that student doing the activity and those students observing are wearing safety glasses.

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TASK NO. 6: PREPARING LEAD FOR POURING SOIL PIPE JOINTS FOR A HOUSE

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Explaining the difference in type of furnaces likely to be found on the job. Reading instructions for lighting furnace. Preparing furnace for lighting. Lighting the heating furnace with a match or lighter.	Lecture. Demonstration.	Collection of catalogues showing different type of LP gas furnaces. LP gas dealer in area - brings in gas furnace for demonstrations. Sparklighter. Gas service hose. Fittings. Cylinders.	Students examine gas furnace displayed by L.P. gas dealer. Prepare table showing different specifications: a. Gas supply connections. b. B.T.U. In-put per hour. c. Temperature range. This information can be found in the catalogues displaying gas furnaces. Have students check all hose and fitting for safe operation then each take his turn at lighting a furnace by using sparklighter.	Check students notebook to see that all required information has been recorded. Observe students performing the furnace lighting operation.
Cutting lead with cold chisel and hammer. Adding lead to molten metal. Observing the proper temperature of molten lead by its color.	Lecture. Demonstration.	Pig lead, hammers, sharp cold chilse. Melting pot, pouring ladle, gas furnace, sparklighters. Textbook: Plumbing, 3rd edition, Harold E. Babbitt, McGraw-Hill Publishing Company, pp. 165-167. Blueprint showing soil pipe layout.	Have students prepare charge of lead by cutting chunks from pig with hammer and chisel (all students will wear safety glasses). Light furnace, place melting pot with charge of lead on flame. Record time required to bring lead to a molten state. Look for a cherry red color. For this operation students will wear asbestos gloves. Have students add additional lead to molten lead by placing chunks of cold lead in warmed pouring ladel then putting into the melting pot. Have students study blueprints and determine number of lead joints that are to be made and diameter of soil pipe. Using this information refer to chart 7-11 on p. 166 and determine number of pounds of lead and oakum needed for the roughing in job.	Observe students while they are cutting chunks of lead. Check on correct techniques of lighting furnace and adding additional lead to molten lead. Check calculations for approximate pounds of lead and oakum needed for the job shown on blueprint. Observe that students are wearing safety glasses and asbestos gloves.
Removing mushroomed heads from a cold chisel with a grinder. Ventilating the area where the furnace is located. Protecting oneself and fellow workers from dangers of molten metal contacting moisture. Protecting oneself by wearing: a. Safety glasses. b. Safety shoes. c. Gloves.	Lecture. Demonstration.	Manufacturer's directions on operating instructions for gas furnace. Textbook: Plumbing, 3rd edition, Harold E. Babbitt, McGraw-Hill Publishing Company, p. 166. Safety glasses. Safety shoes. Asbestos gloves.	Have students read and have class discussion on manufacturer's operating instructions for gas furnace. Have shop well ventilated then permit a small trace of raw gas to escape from furnace for two seconds so that students will have an opportunity to recognize the odor of L.P. gas. Read textbook, Plumbing, p. 166. Each student record in his notebook the statements regarding moisture and molten lead. Permit students to examine safety shoes and asbestos gloves.	Verbal quiz on operating procedure for gas furnace, the effects of moisture on molten lead, and the importance of wearing safety glasses and asbestos gloves when pouring molten lead.

TASK NO. 7: LAYING A DRAINAGE FIELD WITH CLAY PIPE FOR A HOUSE

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading a blueprint to determine grade of drainage field and prescribed method of laying pipe.	Lecture. Demonstration. Film.	Film: "Modern Pipe for Modern Living," 16 MM, color, 27 mins, National Assoc. of Plumbing, Heating, Cooling Contractors, 1016 20th Street, N.W. Washington, D.C. 20036. "Here's How with Clay Pipe," 16 MM, 20 mins (source same as above). Plot plans showing position of homes on lots. Maryland State Department of Health Bulletin #64. Septic Tank manual. Maryland State Department of Health Bulletin 43L02. Regulations governing individual water supply and sewage disposal systems.	Filling in question sheets with high points of the two films that are shown. Students will study two bulletins provided and note specifications that must be observed in the installation of sewage disposal system. Conduct a percolation test.	Check student answer sheets to determine if they have noted high points in movie. Quiz to determine if they have noted the important facts in regards to sewage disposal.
Measuring grade of pipe with a level and rule to an accuracy of 1/4 of an inch in 8 feet.	Lecture. Demonstration.	Rules, level, test plot for digging trench, shovels, picks, rake.	Have students dig trench 8 ft. long and observing Health Department standards for width and depth and establish grade 1/4 of an inch per 8 ft.	Observe students digging trench noting that they employ practices of safe work habits as discussed and followed in Task No. 1 and No. 2. Check trench to determine if it meets Health Department standards as to width, depth, and grade.
Placing coarse gravel or crushed stone below pipe with a shovel. Grading the stone with a hoe so that a grade accurate to 1/4 of an inch in 8 feet obtained as measured by a level and rule. Laying the pipe on top of the stone. Covering joints in the pipe with tar paper. Placing coarse gravel or crushed stone over pipe to required depth with a shovel. Covering coarse gravel or crushed stone with building paper prior to back filling.	Lecture. Demonstration.	Clay pipe, tar paper, building paper, crushed stone, shovels, rakes, tin shears. Maryland State Department of Health Bulletin #64, pp. 4 and 5. Maryland State Department of Health Bulletin No. 43L02, pp. 612-613. Textbook: How to Design and Install Plumbing by A.J. Mathias, Jr. and Esles Smith, Sr., Chapter 11, American Technical Society, Chicago, Ill.	Using trench already dug to grade 1/4 of an inch in 8 ft., construct a section of a drainage field. Refer to directions in the two bulletins on pages indicated. Each student will make up a cross section drawing of a drainage field, showing location of stone, clay pipe, tar paper, building paper, and all measurements. For final back filling of trench, refer to Task No. 2 - Back Filling a Ditch.	Observation of correct sequential stops in constructing a section of a drainage field. Check student drawing to determine if all essential information has been recorded.
Explaining the reasoning behind maintaining proper grade when laying a drainage field. Protecting oneself by wearing: a. Safety shoes. b. Safety helmets. c. Gloves.	Lecture. Demonstration.	8 ft. length of aluminum guttering, level and rule. Note: This area of information can best be covered by lecture in regards and proper use of body in using a pick and shovel and using safety devices.	Have students simulate grade of 1/4 of an inch in 8 ft. using the guttering and then use water to observe how it will flow. Increase grade to 1/2 of an inch in 8 ft. and note increase rate water will flow. The grade can be increased to 1 inch in 8 ft. or 2 inches in 8 ft. Have students draw conclusions in regards to grades of 1/4" in 8 ft, 1/2" in 8 ft, 1" in 8 ft., and 2" in 8 ft. in relation to water flow.	Check students conclusions in maintaining proper grade of 1/4" in 8 ft.

TASK NO. 8: ATTACHING MOUNTING BACKING FOR PLUMBING FIXTURES TO FRAME CONSTRUCTION IN A HOUSE

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading a blueprint to determine location of plumbing fixture. Locating center points on a wall using two measurements.	Lecture. Demonstration.	Blueprints of bathrooms and kitchen showing locations of fixtures that require wall mounting brackets. Rules, framing square. Textbook: Plumbing, 3rd edition, Harold E. Babbitt, McGraw-Hill Publishing Company, Chapters 15 and 16, pp. 393 to 448; tables, pp. 610-617.	Instructor will first demonstrate proper and safe way to use power hand saw. Students examine skill saw and note different type adjustments on saw. Examine safety shield on saw and note how it provides portection for user. Student, wearing safety glasses, will each make several cuts of scrap wood with the power hand saw.	Observation of student making cuts on scrap pieces of wood using the power hand saw. Note that all students, including instructor, are wearing safety glasses.
Explaining the importance of grounding electrical equipment.	Lecture. Demonstration.	Adapter plugs for connecting 2-wire system to 3-wire system. Parallel ground rubber handle caps. Parallel ground rubber connector. Parallel ground duplex receptacle. 3 ft. length 5/8" diameter iron rod. Cable clamps.	From copies of blueprints showing bathroom and kitchen installation students will make up work sheets, showing heights from floor, distance from corners to center of fixtures. Study tables, pp. 610-617, and note standard heights for lavatory and kitchen sink. Add new terms to plumbing vocabulary list as they become evident.	Check student work sheet to determine if they have interpreted blueprints correctly. Examine notebook and check for new vocabulary words.
Measuring material for backing blocks with an accuracy of 1/16 of an inch. Squaring cuts with a framing square to an accuracy of 1/16 of an inch. Cutting backing blocks with power saws or hand saws to an accuracy of 1/16 of an inch. Nailing backing blocks in place with claw hammer using proper nailing pattern to an accuracy of 1/16 of an inch.	Lecture. Demonstration.	Claw hammers, nails, spikes. Framing square, rules, hand saws, power saws. Rough lumber, 2 x 6"s and 2 x 8's - 16 inches long and longer. Mock up wall partition that has a corner.	Have students make survey of shop and determine if all power tools are properly grounded. Make up extension cord with ground, using parallel ground rubber handle cap and parallel ground rubber connector. Using 3 ft. iron rod and cable clamp, ground hand electric drill.	Check survey sheets to determine if students have made complete survey. Examine extension cord to determine if all connections have been made properly. Check improvised grounding exercise, then disassemble.
Using electric power tools safely. Protecting oneself by wearing safety glasses.	Lecture. Demonstration.	Skill saw. Safety glasses.	Using blueprints, students will determine location of lavatory. From these measurements students will determine center line on mock up wall partition. Students will cut backing blocks to fit between studding. Backing block will then be nailed in place.	Check students measurements to determine if they have accurately located center line. Observe students cutting backing blocks, making sure all cuts are square. Check nailing techniques making sure backing blocks have been securely nailed.

TASK NO. 9: ATTACHING MOUNTING BRACKETS FOR PLUMBING FIXTURE TO MASONRY CONSTRUCTION IN A HOUSE

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading instructions to obtain proper hole size for fastener to be used. Reading a blueprint to determine location of fixture.	Lecture. Demonstration.	Toggle bolts, shield and lag screws, rawl plugs, star drills.	Have students read instructions on boxes to determine size of holes to be drilled for a particular size and type masonry fastener. Examine and compare different types masonry fasteners. Make up chart to be placed in student notebook showing size of hole for different size and type masonry fasteners.	Check student notebooks to determine if chart for hole sizes are complete.
Measuring to find location of hangers within an accuracy of 1/16 of an inch. Locating center points on a wall using two measurements.	Lecture. Demonstration.	Blueprints showing location of plumbing fixture to be installed on masonry walls. Mock up of wall including a corner (note this can be a plywood and will be used only for experience in locating center points). Textbook: Plumbing, 3rd edition, Harold E. Babbitt, McGraw-Hill Publishing Company, pp. 610-617.	Have students read blueprints showing location of plumbing fixtures on masonry walls. Record on work sheet exact location from corner to center point. Refer to tables, pp. 610-617, to determine exact height. Using results of blueprint readings, students can use mock up wall [illegible] actually make measurement.	Check record sheets to determine if students have read blueprints correctly to determine fixture location. Check center point location on mock up wall to determine if actual measurements are correct.
Drilling holes for fasteners with an electric drill. Drilling holes for fasteners with star drill and hammer. Driving fastening devices with an impact tool. Attaching mounting brackets in level position with a level and screwdriver or wrench.	Lecture. Demonstration.	Electric drill, masonry drills 1/4", 5/16", 3/8" and 1/2" size. Star drills, hammers, rules, hand impact tool, adjustable wrench, screwdriver, mounting bracket, several cement blocks.	Have students examine the special tools necessary for fastening to masonry walls. Students working in pairs will drill holes in the cement blocks for the following type fasteners: a. Toggle bolt, c. Lay screw and shield. d. Plastic screw anchor. Holes are to be made with a masonry drill in an electric drill, star drill and finally use hand operated impact tool to drive a steel stud into the cement block. Stud will have 1/4" N.C. thread on end exposed for fastening.	Observation of students using the special tools to drill holes in cement blocks. Examine the masonry anchors and determine if they have been properly installed and properly support a plumbing fixture. Note that all students are wearing safety glasses. Those students using star drill and hammer are wearing gloves and that the electric drill has been properly grounded.

Task No. 9 (continued)

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Selecting types of fasteners that best fit the requirements. Explaining advantages and disadvantages of various available fasteners. Using an adjustable wrench properly. Explaining method of installing each type fastener. Using a screwdriver safely. Removing mushroomed heads from a star drill with a grinder. Explaining added precautions when using electric tools if operator is in contact with the ground. Protecting oneself by wearing: a. Safety glasses. b. Gloves.	Lecture. Demonstration.	Training aid board showing the different type hollow or solid wall anchoring devices. Commercial literature illustrating wall anchoring devices, impact tool, adjustable wrench, lag screws, screwdrivers. Check sheets based on manufacturer's recommendations on use of fasteners. Collection of cold chisels, yarning irons, star drills, center punches and drifts, grinder, safety shoes. Adapter plugs for connecting 2-wire system to 3-wire system. Parallel ground rubber handle caps. Parallel ground rubber connector. Parallel ground duplex receptacle. 3 ft. length 5/8" diameter iron rod. Cable clamps.	Read manufacturer's recommendations on use of fasteners and fill in check sheet as to use of specific fasteners. Determine which type of fastener best suited for plumbing fixture. List advantages of specific fasteners. Have students drill several pilot holes in scrap wood. Demonstrate to students correct way to use an adjustable wrench. Specifically point out the importance of having wrench adjusted snugly to fit the head of the lag screw. Have each student perform the operation. Have students check all screwdrivers in shop and repair those screwdrivers that are not square and have rounded edges. Have students examine collection of chisels, drills, etc. and note the condition of each tool examined. Permit students to grind these tools so that all will be free of mushroomed heads. Have students bring chisels, drills, etc. from home and let them restore heads to a safe and servicable conditon. Have students examine pair of safety shoes and note area of foot provided with protection. Have students make survey of shop and determine if all power tools are properly grounded. Make extension cord with ground using parallel ground rubber handle cap and parallel ground rubber connector. Using 3 ft. iron rod and cable clamp, ground hand electric drill.	Check check sheet to determine if all required information has been obtained from manufacturer's recommendations. Check listing of advantages and disadvantages of fasteners. Observe students using adjustable wrench for the exercise. Observe students using adjustable wrench for the exercise. Examine all screwdrivers that have been reground and determine if they have been restored to safe usable condition. Note that students used safety glasses when drilling pilot holes and regrinding screwdrivers. Observation of students performing task of grinding mushroomed heads from tools. Note that student doing the activity and those students observing are wearing safety glasses. Check survey sheets to determine if students have made complete survey. Examine extension cord to determine if all connections have been made properly. Check improvised grounding exercise, then disassemble.

TASK NO. 10: INSTALLING A WATER CLOSET SEAT IN A HOUSE

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading manufacturer's directions for installation.	Lecture. Film.	Film: "The Best Seat in the House," 16 MM, b & w, 28 mins., National Assoc. of Plumbing, Heating, Cooling Contractors, 1016 20th Street, N.W. Washington, D.C. 20036. Commercial literature on water closet seats. Question sheet for high points in movie.	Students will view film and be alert for high points in the film. Study manufacturer's directions and note specific points.	Question the class orally on the high points stressed in the film, the important steps to be followed from the manufacturer's instruction.
Measuring center to center distances to an accuracy of 1/16 of an inch.	Lecture. Demonstration.	Rules. Textbook: Plumbing, 3rd edition, Harold E. Babbitt, McGraw-Hill Publishing Company, plumbing tables and diagrams, pp. 605-608.	Students study tables on pp. 605-608 and note that holes for closet seats are standard. Have students check this standard against water closet in their home.	Question class orally to determine the standardized measurement for the holes for water closet seats.
Exercise personal hygiene following completion of job.	Lecture. Demonstration.	Strong disinfectant, soap, clean towels, industrial rubber gloves.	Instructor explain importance of observing personal hygiene following completion of task. Explain reason for wearing rubber gloves if this task performed in public toilets.	Question class, reasons for observing personal hygiene.
Removing old closet seat with a wrench without damage to the toilet. Cleaning water closet (with cloth and scouring powder) prior to installation of new seat. Installing a new seat with a wrench with soft washers in proper location. Adjusting new seat to line up and place it in balance.	Lecture. Demonstration.	Adjustable wrench, scouring powder, wiping rags, manufacturer's directions, lysol disinfectant, disinfectant soap.	Reading directions on Lysol bottle prepare 1 gallon disinfectant solution. Use disinfectant to clean water closet and seat in restroom in shop. Use wiping rags to wipe dry both water closet and seat. Putting into use the points brought out in film, carefully remove water closet seat. Carefully clean hinge mechanism and remove any corrosion that may be forming on the metal. Use scouring powder to clean washer marks around the holes that are used to secure seat in place. Following procedure recommended in film, reinstall water closet seat. Adjust water closet seat so that it rests squarely on water closet. Clean area after work is completed.	Observe students preparing disinfectant solution. Check to see that area where work will be performed has been thoroughly cleaned. Observe to see that sutdents removing seat, exercise caution while workinn with tools. Check seat to see that all rust and corrosion has been removed from metal parts. Check water closet to see that area around hinge holes have been thoroughly cleaned and no washer marks remain after seat reinstalled. Check to see that it works freely and sets squarely on water closet. Check to see that area has been cleaned after task is completed.

Task No. 10 (continued)

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Using an adjustable wrench properly. Protecting procelain surfaces from damage with tools. Protecting household property of the owner from damage. Cleaning up the work area upon completion of the job.	Lecture. Films.	Textbook: How to Design and Install Plumbing, 4th edition, A.J. Matthias, Jr., Esles Smith Sr., American Technical Society, Chicago, Ill., pp. 331-332. Films: "Moulders of Progress," 16 MM, color, 30 mins, National Assoc. of Plumbing, Heating, Cooling Contractors, 1016 20th Street, N.W., Washington, D.C. 20036. "New Horizons," 16 MM, color, 33 mins. (source same as above).	Read text, pp. 331-332, and answer question on question sheet pertaining to construction of water closet. View two films on manufacturer's bathroom plumbing fixtures. Student discussion on the importance of exercising care when on job and cleaning up area after job completed.	Check answer sheet to determine if questions were answered correctly. Question students about high points in film dealing with manufacturer of bathroom fixtures.

TASK NO. 11: INSULATING HEATING AND WATER LINES FOR ECONOMY AND APPEARANCE

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading blueprint to determine pipes to be insulated. Reading manufacutrer's instruction for installing insulation.	Lecture.	Textbooks: How to Design and Install Plumbing, 4th edition, A.J. Matthias, Jr., Esles Amith, Sr., American Technical Society, Chicago, Ill. pp. 254-255. Plumbing, 3rd edition, Harold E. Babbitt, McGraw-Hill Publishing Co., New York, N.Y., pp. 162-163; 187-188. Samples of insulating material.	Read textbook assignments and answer questions on prepared question sheets. Read prepared material supplied from manufacturer to see how it compares with textbook information.	Check student answer sheets to determine if all questions have been answered satisfactorily.
Measuring the length of the insulation with a rule to an accuracy of 1/8 of an inch. Adding, subtracting, multiplying, dividing in order to economically cut stock to correct length.	Lecture.	Pencils, paper, several isometric drawings that have been dimensioned and show hot water lines in a house.	Students use isometric drawing to figure out a bill of material for all the insulation needed to insulate the hot water lines in a house.	Check bill of material to determine if calculations have been done correctly.
Cutting insulation to length with a fine saw or knife to an accuracy of 1/8 of an inch. Attaching insulation to pipe with metal bands. Mixing asbestos cement for fitting with a trowel. Applying asbestos cement around fittings by hand. Wrapping asbestos cement with cloth to hold it in position. Demonstrating safe use of a step ladder.	Lecture. Demonstration. Film.	Random lengths of 1/2" copper tubing, elbow's, tee's, propane torch, acid core solder, tubing cutter, emery cloth, rule, sharp knife, 5 lbs. asbestos cement, 5 gal. pail, several 4 ft. lengths of foam plastic pipe insulation, 1 sheet 30 gage tin, 1 roll 18 gage iron wire, soldering iron, tin shears, stepladder. Film: "Covering Hot and Cold Pipes," 16 MM, 22 mins., National Assoc. of Plumbing, Heating, Cooling Contractors, 1016 20th Street, N.W., Washington, D.C. 20036. Scrap pieces of rough lumber. Safety glasses.	Have students make up water line from 1/2 inch copper tubing; line is to have elbows and t's. They are to use skills learned from other tasks. Measuring, cutting, reaming, cleaning and sweating fittings and tubing together. Employing carpenter skills, erect temporary bracing to hold water line in place. Have students make up bands by cutting strips of tin 1 inch wide and 12 inches long. Put 1 inch fold on one end. Using 18 gage iron wire make up loops by wrapping wire around 1/16" thick and 1" wide band iron. Place the loops through 1 inch fold and solder in place. Have students measure length of runs between fitting. Cut pieces of foamplastic to correct length and install on the pipe. Fasten foamplastic insulation in place by wrapping the fabricated tin bands around the insulation. Secure bands by running plain end through loop on other end. Pull band up snugly and fold over loop. Leave approximately 2" of tin beyond loop, cut off excess. Mix 5 lbs. of asbestos cement in 5 gallon pail. Mixture is correct consistancy when it resembles pan cake batter. Carefully apply asbestos cement around all fittings in the line. While cement is still wet, wrap it with strips of porous or loosely woven cloth, such as cheese cloth. This cloth is to help hold the asbestos cement in place.	Observation of students executing tasks necessary to assemble a water line. Note that safety precautions are employed such as wearing safety glasses when soldering and sweating fittings; electric saw is grounded and glasses are worn when using saw to construct temporary bracing. Observation of students using correct work habits in making up tin bands. Check student measurement at random to determine if insulation is cut to have a minimum waste. Check bands to determine if they have been fastened securely and excess tin has been cut away from ends before applying asbestos cement. Check to determine if it has been thoroughly mixed. Examine application of asbestos cement around joints and determine if sufficient cloth has been applied to hold the asbestos cement in place. Allow reasonable time for asbestos cement to dry perhaps two days. Have students evaluate task and then disassemble. Exercise care in disassembly so that all items may be salvaged and used in other tasks. Check student notebooks to see that all items relating to the step ladder have been listed.

Task No. 11 (continued)

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
			After task has been completed, show film, "Covering Hot and Cold Pipe," Students will be given an opportunity to evaluate techniques of others in the act of performing a task. Discussion following movie to make a comparison. Under instructors guidance students will examine a step ladder and note features necessary for ladder to be safe to use: a. No loose or wobbly steps. b. Steps reinforced with steel rod. c. Spreader lock that locks securely when in use and can be quickly and easily unlocked for closing. d. Tool and pail shelf that locks in place and can be quikcly unlocked. e. Rear legs are well braced and sufficiently wide to insure stability to the ladder. f. When using ladder be sure that all four legs of the stepladder are resting firmly on a solid surface. The spreader locks are locked in the open position.	

TASK NO. 12: ASSEMBLYING A FURNACE USING WRITTEN INSTRUCTIONS

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading manufacturer's directions for assembly.	Lecture.	Collection of manufacturer's direction for assembly of furnaces. Collection of transparency of parts of furnaces.	Students read directions for assembly of furnaces. Make list of component parts of conventional warm air furnace. View transparencies to become familiar with parts of a furnace.	Question and answer session on manufacturer's directions for furnace assembly.
Explaining the importance of grounding electrical equipment.	Lecture. Demonstration.	Adapter plugs for connecting 2-wire system to 3-wire system. Parallel ground rubber handle caps. Parallel ground rubber connector. Parallel ground duplex receptacle. 3 ft. length 5/8" diameter iron rod. Cable clamps.	Have students make survey of shop and determine if all power tools are properly grounded. Make up extension cord with ground using parallel ground rubber handle cap and parallel ground rubber connector. Using 3 ft. iron rod and cable clamp, ground hand electric drill.	Check survey sheets to determine if students have made complete survey. Examine extension cord to determine if all connections have been made properly. Check improvised grounding exercise, then disassemble.
Removing crating material without damage to contents with a claw hammer and pry bar. Assembling sections, lock washers placed properly, with a screw driver and pliers. Leveling the furnace unit with a level. Mixing fire clay with a trowel for laying up fire brick. Drilling holes for bolts and sheet metal screws with an electric drill.	Lecture Demonstrations	Claw hammers, pry bar, pliers, screw drivers, level, 26 gauge galvinized iron, tinners rivets, sheet metal screws setting hammer, rivet set, round-head stove bolts, hand electric drill, tin shears. Fire brick, fire clay. mason's trowel. Overhead projector. Visual showing grated furnace and steps for uncrating.	Explain an orderly procedure for uncrating a furnace. A mimeographed sheet listing this procedure to be given students after lecture using the overhead projector to show these steps. Students will study different methods of fastening sheet metal by doing an exercise as follows: 3" x 3" squares fastened together in the following manner and using the appropriate tools and techniques for each method: a. By riveting. b. Stove bolts. c. Bolts, nuts and lockwashers. d. Sheet metal screws.	Observation of students performing the various operations to fasten the metal squares together using each method outlined.
			Mixing up a batch of fire clay and using fire brick to lay up a small combustion chamber, making up a step-by-step procedure for setting up a furnace.	Oral questioning regarding needs for leveling a furnace.

Task No. 12 (continued)

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Removing nails from crating material with a hammer to preserve safe working conditions. Cleaning up the work area upon completion of the job. Using a screwdriver safely. Using electric power tools safely. Explaining added precautions when using electric tools if operator is in contact with the ground. Protecting oneself by wearing: a. Safety glasses. b. Safety shoes. c. Gloves.	Lecture. Demonstration.	Scrap lumber with nails driven through to assimilate crating material. Rip hammer, claw hammer, pinch bar.	Removing nail from lumber using correct techniques so as to avoid breaking handles from hammer. Practicing clean housekeeping habits in performing tasks. Students using electric power tools observe following precautions: a. Safety guards are in place and functioning properly. b. Operator and helpers are wearing safety glasses. c. Use the tool only for its intended use. Don't improvise. d. Check cord to be sure no wires are exposed. e. Check to see that tools are properly grounded. f. Clean electric power tool after finished using. g. Store power tool in its proper place when you are finished using it.	Observe students performing operation of removal of bent nails from scrap lumber. Check students using power tools to determine if they are observing safety precautions.

TASK NO. 13: INSTALLING DUCT WORK FOR WARM AIR HEATING SYSTEMS IN A HOUSE

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading a blueprint to determine location of ductwork.	Lecture.	Blueprints showing location of ductwork to be installed in a home. Prepared work sheets for warm air heating installation. Catalogues listing and showing all different types of fittings.	Have students make up bill of material for al. differnet fittings and duct work necessary to install warm air system in a home.	Check students bill of material list to determine if all items have been listed.
Measuring sheet metal to size with a ruler to an accuracy of 1/16 of an inch.	Lecture. Demonstration.	4 ft. rules, sheet galvanized tin, scratch awl, square, roll 24" wide, brown wrapping paper.	Students will use wrapping paper to assimilate sheets of falvanized tin. On these sheets of wrapping paper they are to lay out all lines necessary to make a duct 24" long, 3 1/4 " x 10".	Check student lay out to determine if they have made all measurements correctly.
Explaining the importance of grounding electrical equipment.	Lecture. Demonstration.	Adapter plugs for connecting 2-wire system to 3-wire system. Parallel ground rubber handle caps. Parallel ground rubber connector. Parallel ground duplex receptacle. 3 ft. length 5/8" diameter iron rod. Cable clamps.	Have students make survey of shop and determine if all power tools are properly grounded. Make up extension cord with ground using parallel ground rubber handle cap and parallel ground rubber connector. Using 3 ft. iron rod and cable clamp, ground hand electric drill.	Check survey sheets to determine if students have made complete survey. Examine extension cord to determine if all connections have been made properly. Check improvised grounding exercise, then disassemble.

Task No. 13 (Continued)

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Cutting sheet metal to size by hand with a straight snips or aviation snips within an accuracy of 1/16 of an inch. Making sheet metal hangers for duct work with shears, barfolder, brake or improvised bending equipment. Attaching hangers to framing members with a hammer. Removing bent nails with a bar or hammer. Assemblying seams of prefabricated duct work. Fastening sheet metal together with sheet metal screws and a screwdriver. Drilling holes in sheet metal by hand and an electric drill. Bending sheet metal by hand using a mallet, hand seamer or other improvised methods. Making seams in sheet metal using hand method.	Lecture. Demonstration.	Tin shears, rules, aviation shears, try squares, scratch awl, rubber faced hammer, C clamps, marking gage, two maple boards 1" x 3" x 24", sheet of galvanized metal - 30 gage, claw hammers, screw nails 1 1/4" x 11, type a and type z sheet metal screws - #8, 3/4", scredrivers, hand drill, electric drill; brake, heavy duty rivet tool, mallet, hand seamer. Textbook: Sheet Metal Principles and Procedures, Emanuele Stieri, Prentice-Hall Publishing Company, New York, N.Y. Chapter 8, pp. 161-165; Chapter 5, pp. 121-129.	Have students make hangers by cutting strips of galvanized 1 3/4 " wide by 20" long. Make 3/8 of an inch fold on each side. Finished hanger should be 1 inch wide by 20 inches long. Tools to use: ruler, scratch awl, brake, tin shears, marking gage, soft face hammer. Attach hangers to an improvised floor joist so that it will support a short length of warm air duct. Use screw nails 1 1/4" x 11" to fasten hangers to joist. Remove nails from hangers after task has been completed. Have students fasten 3" x 3" squares of galvanized tin using #8 by 3/4 of an inch sheetmetal screws. Use type A and type Z screw to fasten the two pieces of metal together. Check charts on p. 162 and 164 for correct hole size to be drilled for each type screw. Drill one hole using a hand drill. Drill second hole using an electric drill. Have students make up a chart from tables on pp. 162-164 for type A and type Z screws. Hole sizes to be drilled for the most commonly used screws - #6, #8 and #10. Have students make a seam. Use two pieces of 3" x 3" sheet galvanized. Put 1/4" fold on each piece. 1st piece fold by using brake, 2nd piece fold by clamping piece between maple blocks and bending extended 1/4, edge flush with the wood. Use soft faced hammer to then bend edges over to complete fold. Join the two folded edges to form a seam. Secure seam firmly by settting with the hand seamer. Have students read Chapter 5, pp. 121-129 - answer questions on question sheet.	Check hangers to determine if they have been correctly made by measuring overall width and width of fold on each edge. These measurements should be accurate. Check nailing to determine if done correctly. Observe student removing nails to determine if they are using correct techniques. Check student work to determine if they have followed directions carefully. Check notebooks to determine if they have assembled information correctly. Check students work to determine if it is carefully and neatly done. Question students relative to the advantage of using the brake to make a fold over using improvised blocks and clamps. Question students as to why they use a soft faced hammer to make this seam rather than a hard hammer. Check question sheet to determine if questions are answered correctly.
Using a screwdriver safely. Using soft faced tools for shaping sheet metal. Cleaning up work area upon completion of the job. Using electric power tools safely. Demonstrating safe use of step ladder. Explaining added precautions when using electric tools if operator is in contact with the ground. Protecting oneself by wearing: a. Safety glasses. b. Safety helmets. c. Gloves.	Lecture. Demonstration.	Soft face hammers: a. Hard rubber. b. Plastic. c. Rawhide. 1 sheet 30 gage galvanized steel. Step ladder. Textbook: Sheet Metal Principles and Procedures, Emanuele Stieri, Prentice-Hall Publishers, New York, N.Y., Chapter III, pp. 23-25.	Have students read Chapter III and make up list of hand tools needed for sheet metal work.	Check tool list to determine if it is complete.

TASK NO. 14: INSTALLING PLASTIC PIPE FOR PLUMBING LINES FOR A HOUSE

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading a blueprint to determine length of pipe placement of fittings and location of installation.	Lecture. Demonstration.	Blueprints showing location of plumbing installations that are to be made from plastic pipe. Prepared work sheets, catalogues of plastic pipe and fittings.	Have students study blueprints and make up a bill of material of all plastic pipe and different fittings needed for installation. These items are to be listed on prepared work sheet.	Check student work sheets against master list to determine if items have been listed.
Measuring length of pipe with a ruler to an accuracy of 1/8 of an inch.	Lecture. Demonstration.	Color coded short lengths of plastic pipe. Prepared work sheet.	Students are to measure length and diameter of color coded short lengths of plastic pipe. Measurements are to be recorded in proper order on prepared work sheet.	Check work sheets against master list to determine if all pieces of plastic pipe have been measured accurately.
Adding, subtracting, multiplying, dividing in order to economically cut stock to correct length.	Lecture. Demonstration.	Blueprint of the plastic plumbing installation. Work sheet.	Assuming students have assorted lengths of plastic by using prepared bill of material students are to determine and record on work sheet the most economical way of cutting pipe to be used on installation.	Check work sheets against master work sheet to determine if most economical cuts will be made.
Cutting pipe to length with a knife to an accuracy of 1/8 of an inch. Softening pipe in hot water prior to installation. Attaching required fittings in place with a screwdriver or with press fit. Fastening pipe in place with pipe hangers.	Lecture. Demonstration.	50 ft. roll 3/4 inch plastic pipe, sharp knife, rule, selection of plastic fittings, adapter's, well ell's, stainless steel clamps, nylon ell's, nylon tee's, screwdrivers, hacksaw.	Have students make up a plastic pipe plumbing installation using all the different types of fittings and employing all recommended and approved methods of working with same. Each student will make one cut during the course of the assembly.	Check assembly as it is being constructed observing students employing approved methods of work; observe for the observation of safe work habits. Check the exercise for sloppy work by connecting with a cold water line and inspect for water leaks.
Using plastic pipe only in places and for use for which it was intended. Using a screwdriver safely. Demonstrating safe use of a step ladder. Protecting oneself by wearing: a. Safety glasses. b. Safety shoes. c. Safety helmet. d. Gloves.	Lecture. Demonstration.	Plumbing code for community where you reside and county code. Step ladder. Screwdriver.	Have one student study local code and code for county and prepare a report that lists the areas where plastic pipe and fittings may be used in plumbing installation.	From contents of report have students discuss merits of plastic pipe in plumbing.

TASK NO. 15: SOLDERING SHEET METAL AND COPPER TUBING TO BE USED IN A HOUSE

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Interpreting solder and fluxing composition from manufactures specification.	Lecture.	Printed literature describing manufacturer's product and direction for best use.	Making a list of types of solders and fluxes and the specific use for which they are made.	Instructor question students about different types of soldering fluxes and solder. Checking student notebooks.
Explaining the composition of solder. Ex[illegible]ing the need for fluxing action. [illegible]ing the precautions [illegible]e when using acid flux. rotecting LP soldering equipment from oil.	Lecture. Film.	Textbook: Sheet Metal Principles and Procedures by Emanuele Stieri, Prentice Hall Publisher, Chapter 6. Prepared set of study guide questions based upon science and in area of Human Requirements. Film: "Big League Soldering," 16MM, color, sound, National Association of Plumbing, Heating, Cooling Contractors.	Students read chapter 6 - soldering materials and procedures and answer on work sheet questions on study guide.	Oral question and answer session. Instructor checks students answer sheet to determine if all questions have been answered correctly.
Cleaning metal preparatory to soldering with a file, emery cloth or steel wool. Using proper fluxes for various metals. Tinning a surface with a soldering copper or other soldering device. Using various sorts of heat for soldering. Soldering with a flame or soldering copper. Sweating two pieces of metal together with soldering equipment.	Lecture. Demonstration.	Acid core solder, rosin core solder, bar solder, NoKorode solder flux, zinc chloride, 1 pound soldering copper, electric soldering iron, electric soldering gun, LP torch and accessories, gas furnace, sal ammoniac block and short pieces of 1/2 inch copper tubing, copper fittings, 3 inch x 3 inch squares of galvanized steel, copper wire.	Each student will be required to solder pieces of metal using acid core solder, bar solder, to use NoKorode solder flux, zinc chloride flux. Use emery cloth to clean copper tubing and fitting and then sweat joint using acid core solder, NoKorode flux, and L.P. torch as a source of heat. Use electric solder gun to solder copper wire together. Use rosin core solder for this operation.	Observe students performing soldering tasks, noting that each operation is carefully executed, that students are wearing safety glasses, that each student exercises caution in doing the operation. Check each student's exercise and determine if it has been satisfactorily done.
Handling LP torch and accessories with care. Protecting oneself and others from hot metal. Protecting oneself by wearing safety glasses. Demonstrating safe use of step ladder and extension ladder.	Lecture. Demonstration.	Instructional manual for LP torch and accessories. Safety glasses. Step ladder. Extension ladder.	Have students read instruction manual for using LP torch and accessories. Have students list the step to follow in preparing to use the torch. List steps to follow when finished using torch. Have students enumerate all precautions that one must follow in performing soldering operations.	Oral review of steps to observe while using LP torch and accessories. Discuss as a class all precautions that must be observed when soldering. Review material which students have entered in their notebook.

TASK NO. 16: REPAIRING LEAKS IN A WATER CLOSET IN A HOUSE

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading manufacturer's directions on repair parts.	Lecture.	Manufacturer's parts list and installation instructions for flush valves. Textbook: How to Design and Install Plumbing, 4th edition, A.J. Matthias, Jr., Esles Smith, Sr., American Technical Society, Chicago, Ill.,pp. 335-340	Have students study manufacturer's list of parts and assignment in text. Have students label different part of fixtures in a flush tank (drawing will be handed out by instructor).	Check labeled drawing to see that all parts are properly labeled.
Shutting off water supply. Adjusting float valve with pliers and screwdriver for proper storage level in the tank. Adjusting the float to change the water storage level. Adjusting tank ball with pliers and screwdriver for proper floatation and seating of the tank ball. Replacing and adjusting tank ball in a water closet. Adjusting tank flush valve to prevent leaking. Adjusting tank level action to achieve smooth action.	Lecture. Demonstration. Overhead projector.	Two complete accessories for water closet flush tank, flush tank, and mounted so that is can be connected to a water supply and provisions for drainage. Textbook: How to Design and Install Plumbing, 4th edition, A.J. Matthias, Jr., Esles Smith, Sr., American Technical Society, Chicago, Ill. pp. 335-340. Pipe wrenches, pliers, screwdrivers, wiping rags. Visuals of working parts and adjustments of toilet mechanism. Overhead projector.	This task can be and should be conducted individually or as a team of two students: Students should use a check sheet procedure to perform all the skills as listed in the area of Human Requirements. In order for this task to be beneficial a flush tank should be set up in some area of the shop and available for the students to work with as time is available. As each student completes the task his name can be checked on the task sheet.	Check the completed task by checking the flushing mechanism to determine if it functions properly. Check students check sheet to determine if all areas have been satisfactorily covered.
Protecting household property of the owner from damage. Cleaning up work area upon completion of the job. Protecting porcelain surfaces from damage with tools. Using a screwdriver safely.	Lecture.	Manufacturer's publications on care and cleaning of appliances. Wrench. Leather or soft metal. Screwdriver.	Have each student make a list of 10 essential do's for a good plumber going into a home to make a repair or a new installation. These essentials must include such items as care in working in a home, neat workmanship, clean-up after task is completed, and others that will indicate pride in work. Students will then select the 10 best do's and adopt them as a code for good workmanship to be used during the school year. Mimeographed copies will be given to each student to be placed in notebook.	Review each students contribution towards class code for good workmanship.

TASK NO. 17: REPAIRING LEAKS IN A FAUCETS IN A HOUSE

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading manufacturer's directions on repair parts.	Lecture.	Manufacturer's publications on faucets. Textbooks: Plumbing, 3rd edition, Harold E. Babbitt, McGraw-Hill Publishing Company, Chapter 4, pp. 364-388. How to Design and Install Plumbing, 4th edition, A.J. Matthias, Jr., Esles Smith, Sr., American Technical Society, pp. 344-345.	Have students read publications and the two text book assignments. Make up a list of the different typas of faucets. Label the parts of a conventional faucet on the drawing given to students.	Check list of faucets and chek labeled drawing to determine if all parts are listed.
Measuring washer size with a ruler to an accuracy of 1/32 of an inch.	Lecture. Demonstration.	Rules calibrated to 32nd of an inch. Assortment of faucet washers of various size.	Students not working on a task may be given a box of faucet washers to measure. These measurements are to be recorded on a regular prepared check sheet.	Check student work sheet to determine if all measurements are done correctly.
Shutting off water supply. Turning faucet handle to on position. Removing handle with a screwdriver if necessary. Removing faucet assembly with a wrench. Replacing packing around stem if necessary. Reassembling faucet assembly with a wrench. Adjusting the packing nut with a wrench. Removing a swing faucet with a wrench. Replacing the washers on a swing faucet. Reassembling a swing faucet with a wrench. Protecting polished fittings from wrench jaws with soft metal, cloth, fiber or cardboard. Using a faucet properly to preserve washer life. Protecting household property of the owner from damage. Protecting procelain surfaces from damage with tools. Cleaning up the work area upon completion of the job. Using an adjustable wrench properly. Using a screwdriver safely.	Lecture. Demonstration.	Screwdrivers, pliers, adjustable wrenches, collection of faucet washers, stem packing, swing faucet washers, single faucets, combination faucets to perform task under conditions. Strips #16 gage copper - 1 1/2 inch wide x 1 1/2 long.	Students working in pairs as other tasks are in progress work with faucets. Using a prepared work sheet that involves all the areas under Human Requirements students are to disassemble faucets. Study the manner that faucets operate and make replacements as indicated in work guide sheet. Use labled drawing to identify parts. Reassemble faucets so that they could be put in service. Have students perform the same task on a working faucet in order to have meaning to their work.	Check students work as he works on the sample faucets. Check work sheet to determine if all areas have been covered. Check working faucet for leaks and proper assembly.

TASK NO. 18: CLEANING WASTE LINES WITH A SNAKE IN A HOUSE

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading a blueprint to locate clean-out plugs in waste lines.	Lecture. Demonstration.	Blueprints of plumbing installations.	Have students study blueprints and itemize the number of clean out points provided for in the plumbing installation. Have each student check the number of clean out plugs in the waste lines of the plumbing installation in their home. Each student should make a drawing of the waste lines in his home and mark each clean out plug.	Check student work sheet to determine if all clean out plugs were listed. Check student sketch of waste lines in his home to note location of clean out plugs.
Removing a clean-out plug from a trap with a wrench. Cleaning out a trap from the clean-out hole with a wire. Replacing a clean-out plug in a trap with a wrench. Disconnecting a trap with a wrench. Cleaning a waste line from a sink or lavatory with a snake. Connecting a trap with a wrench. Removing clean-out plugs from soil pipe lines with a wrench. Cleaning out soil pipe lines with a snake. Replacing clean-out plugs in a soil pipe with a wrench. Replacing gaskets on traps and clean-out plugs. Cleaning a snake following use with a cloth. Oiling a snake following use to prevent rust. Exercising proper personal hygiene following completion of work.	Lecture. Demonstration.	Textbook: Plumbing, 3rd edition, Harold E. Babbitt, McGraw-Hill Publishing Company, New York, N.Y., pp. 308-322; 472-480. Pipe wrenches, adjustable wrench, drain and waste line spring rods, flat steel sewer tape, toilet auger, rubber plungers, assorted size gaskets and rubber washers, collection of traps with and without drain plugs. Wiping rags, can of oil. Industrial rubber gloves. Disinfectant soap - towel, wiping cloths.	Have students read the assignments in the textbook and answer questions on the question study sheet. Students examine the collection of traps and note the areas of the trap that may be a source of trouble from the standpoint of leaks and accumulation of waste material. In groups of three or four take students into the kitchen of the cafeteria to examine the traps and to remove a drain plug from a trap and clean it thoroughly. Replace drain plug, check to see if any leak occurs around the plug. Clean the area where task was performed and replace any items that had to be removed to perform the task. Have students simulate cleaning a snake by stretching it out and wiping it dry. As it is being coiled up wipe the snake with any oily rag.	Check student notebooks to see that all questions on the assignment sheet have been properly answered. Have a discussion on the type of traps observed in the kitchen of the cafeteria. Observe students as they are performing the task on the trap. Note that the students practice the essentials of a good plumber.

Task No. 18 (continued)

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Protecting household property of the owner from damage. Cleaning up the work area upon completion of the job. Using an adjustable wrench properly. Protecting polished fittings from wrench jaws with soft metal cloth, fiber or cardboard. Demonstrating safe use of step ladder. Recognizing various types of snakes available for cleaning out waste lines. Protecting oneself by wearing gloves. Tightening traps and clean out plugs snugly without undue force.	Lecture. Demonstration.	Industrial rubber gloves, disinfectant soap, towels, drain and waste line spring rods, flat steel sewer tapes, toilet augers, rubber plungers, adjustable wrench, pipe wrench.	Students will examine different type of tools used to clean out waste lines. Make up a list of these tools and note the specific operations that each tool has been designed to perform.	Check student list to see that the different type of clean out tools have been enumerated. Test students on important points in task.

TASK NO. 19: WELDING ANGLE IRON FOR PIPE HANGERS

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
Reading instructions for assembling gas welding equipment.	Lecture.	Textbook: Gas and A.C. Arc Welding and Cutting, R.F. Jennings, McKnight & McKnight Publishing Company, Bloomington, Ill., units 1 through 4, pp. 14-19.	Have students read text and answer all questions at the end of each assigned unit.	Check answers for the questions at the end of each assigned unit.
Measuring length of hanger with a rule to nearest 1/8 of an inch.	Lecture. Film.	Film: "Laying Out and Installing Hangers," 16 MM, b & w, 19 mins., National Assoc. of Plumbing, Heating, Contractors, 1016 20th Street, N.W, Washington, D.C. 20036	Students will note important points stressed in the movie and make a list of them for their notebook.	Oral questions relating to the important points brought out in the film. Check student notebooks.
Protecting gas welding equipment from contact with oil. Explaining basic principles of welding metal.	Lecture.	Textbook: Gas and A.C. Arc Welding and Cutting, R.F. Jennings, McKnight & McKnight Publishing Company, Bloomington, Ill., pp. 107-108.	Have students read text and list all the reasons for keeping oil away from the acetylene welding equipment. Students will list the basic principles of welding metal.	Check student listing to see that all points are listed. Oral questioning on basic principles of welding.
Setting up equipment with a wrench preparatory to welding. Turning gas on with regulator at beginning of operation. Lighting torch correctly with a sparker. Adjusting flame to neutral. Laying a bead with welding rod and torch. Cleaning a bead with chipping hammer and a brush. Shutting off flame properly. Shutting down equipment at end of operation.	Lecture. Demonstration.	Textbook: Gas and A.C. Arc Welding and Cutting, R.F. Jennings, McKnight & McKnight Publishing Company, Bloomington, Ill., units 5 through 9, pp. 19-26. Complete oxyacetylene welding unit, welding glasses, welding booth, chipping hammer, fire extinguisher.	Students will study assigned units and make any notes necessary to more clearly understnad material covered in assignment. Each student will proceed in an orderly manner through the skills listed under Human Requirements. As a student completes the tasks he will be permitted to work in the welding booth assisting a neophyte welder and as the neophyte welder completes his tasks another studnet comes into the booth to work under a new trainer.	Each student must pass a written test before being permitted to go to the welding booth. Observe students as they are performing their tasks to become familiar with the techniques of oxyacetylene welding.
Selecting proper rods for the job. Protecting oneself and others from hot metal. Protecting rubber tubing when welding. Ventilating the area to provide safe working conditions. Protecting oneself by wearing: a. Safety glasses. b. Safety shoes. c. Safety helmets. d. Gloves.	Lecture. Demonstration.	Textbook: Modern Welding Practices, A.D. Althouse and C.H. Turnquist, Goodheart-Wilcox Publishing Company, Homewood, Ill., pp. 54-67. Welding booth area for putting newly welded pieces that are still hot. Area for welding well ventilated. (Note) This area of information can best be covered by lecture in regards to correct work habits and proper use of body in using a pick and shovel and using safety devices.	Have students read assignment and make a chart of the most commonly used size of welding rods and size of welding tip for normal welding. See that students keep area around welding booth clean and hot metal is stored until it has cooled in a place that is not dangerous. Students are to keep ventilating fan in welding booth in operation at all times welding is being done.	Check student charts for most popular size welding rods chart of different size welding tips. Observe that all safety precautions are being practiced during welding operations.

OCCUPATIONAL INFORMATION UNIT FOR PLUMBING

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
The employment outlook: 1. Local 2. National	Lecture. Field trip.	Publication: Bulletin #1450-60, Employment Outlook for Plumbers and Pipefitters, pp. 9-12, reprint from 1966-67 Occupational Outlook Handbook, U.S. Department of Labor, Government Printing Office, Washington, D.C. Local contractors.	Visiting local plumbers and pipefitters, and plumbing contractors to determine the local employment outlook. Visit Maryland State Employment Service and interview personnel about job opportunity in the community.	Review reports of students' visits to local employers and state employment service.
The wage scale: 1. Local a. union (1) apprentice (2) journeyman (3) master b. non-union (1) entry wages (2) experienced 2. National a. union (1) apprentice (2) journeyman (3) master b. non-union (1) entry wages (2) experienced	Lecture. Speaker representing a contractor or union.	Overlay-developed tranparency showing wage scales for the plumbing trade on local and national levels for the union and non-union.	Visiting local employers and union officials to obtain information pertraining to wage scales. Making up charts showing these wage scales.	Oral reports bv students pertaining to wage scales of union and non-union plumbers.
The types of training available: 1. Apprenticeshop programs 2. Technical or trade schools 3. On-the-job 4. Military	Lecture.	Publication: Bulletin #1450-60, Employment Outlook for Plumbers and Pipefitters, pp. 9-12.	Interviewing employers and plumbing union officials to determine the type apprenticeshop programs. Making up chart showing period of time required to complete apprenticeshop program, wages during apprenticeshop program, and educational requirements. Making up list of technical or trade schools. Interviewing employers and determining which employers provide on-the-job training. Reading Navy Training Manual (NAUPERS 10630-C), pp. 177-197 to determine type plumbing training available.	Check student's charts and lists to determine if the area of training opportunities have been thoroughly covered and developed.

OCCUPATIONAL INFORMATION UNIT FOR PLUMBING (continued)

AREA OF HUMAN REQUIREMENT	SUGGESTED TEACHING METHODS	SUGGESTED INSTRUCTIONAL MATERIALS	SUGGESTED STUDENT ACTIVITIES	SUGGESTED EVALUATION PROCEDURES
The working conditions experienced in the occupation.	Lecture. Experienced craftsman as guest speaker.	Publication: Bulletin #1450-60, Employment Outlook for Plumbers and Pipefitters, pp. 9-12. Job Guide for Young Workers, U.S. Department of Labor, Government Printing Office, Washington, D.C., 1963-64 edition, p. 53.	Reading pages in the two bulletins to become familiar with working conditions. Interviewing plumbers and preparing a report from these interviews.	Review student reports on working conditions.
The physical and mental characteristics needed for qualification for employment.	Lecture.	Publication: Bulletin #1450-60, Employment Outlook for Plumbers and Pipefitters, pp. 9-12. Job Guide for Young Workers, U.S. Department of Labor, Government Printing Office, Washington, D.C. 1963-64 edition, pp. 53-67.	Reading pages in the two bulletins to become familiar with physical and mental characteristics and interviewing plumbers.	Review student reports on physical and mental characteristics needed for plumbing.
The geographical location of employment.	Lecture.	Publication: Bulletin #1450-60, Employment Outlook for Plumbers and Pipefitters, pp. 1-6. Daily and Sunday papers.	Reading bulletins to determine the section of the country where consturction is being done in a large scale. Using the daily and Sunday papers, check the job opportunities for the plumbing trade in the community and larger adjacent cities.	Review student reports on geographical location of employment.
The opportunities for advancement.	Lecture. Painting contractor as guest speaker.	Publication: Bulletin # 1450-60, Employment Outlook for Plumbers and Pipefitters, pp. 1-6.	Interviewing plumbers and plumber contractor to determine opportunities for advancement in the trade.	Review reports of student interviews.
The advantages and disadvantages of the occupation: 1. Advantages 2. Disadvantages	Lecture. Visiting a job site with the class.	Publication: Job Guide for Young Workers, U.S. Department of Labor, Government Printing Office, Washington, D.C., 1963-64 edition, pp. 53-67.	Preparing a list of the advantages and disadvantages of the plumbing trade. Consolidating lists so that all lists are the same.	Review lists of advantages and disadvantages of plumbing trade.
The nature of the work involved in the occupation.	Lecture.	Publication: Bulletin #1450-60, Employment Outlook for Plumbers and Pipefitters, pp. 9-12.	Reading assigned pages in bulletin to become familiar with work involved in plumbing. Visiting construction site to observe plumbers actually performing plumbing tasks.	Oral quiz on nature of work involved in plumbing.
The union involvement in the occupation.	Lecture. Union representative as guest speaker.	Publication: Bulletin #1450-60, Employment Outlook for Plumbers and Pipefitters, pp. 9-12.	Interviewing plumbers and pipefitters and plumbing contractors to determine the trends for union in the plumbing trade in the community and from these reports prepare a consoliated report.	Review student reports from interviews.

INSTRUCTIONAL MATERIALS LIST

FOR

THE CONSTRUCTION CLUSTER

CARPENTRY

Books

Mix, Floyd M. and Cirou, Ernest H. *Practical Carpentry*. Homewood, Illinois: The Goodheart-Willcox Publishing Company. 1963.

Lair, E. A. *Carpentry for the Building Trades*. New York: McGraw-Hill Publishing Company. 1963.

Films

"The Carpenter"
16mm., sound, color, 52 minutes
U.S.O.E.

"Language of Drawing - Shape Description"
16mm., sound, 30 minutes
McGraw-Hill Company
330 West 42nd Street
New York, N.Y. 10036

"Ladders, Scaffolds, and Floor Openings"
Aetna Life Affiliated Company
Hartford, Conn.

"Framing: Rafter Principles and Common Rafters"
United World Films, Inc.
1445 Park Avenue
New York, N.Y.

"Interior and Exterior Trim"
United World Films, Inc.
1445 Park Avenue
New York, N.Y.

"Fundamentals of Stair Layout"
United World Films
1445 Park Avenue
New York, N.Y.

"Outside Story"
16mm., sound, 25 minutes
United States Gypsum
300 W. Adams Street
Chicago, Illinois

"My Father's House"
16mm., sound, color, 50 minutes
U. S. Gypsum
300 W. Adams Street
Chicago, Illinois

"Within these Walls"
U.S. Gypsum
300 W. Adams Street
Chicago, Illinois

"The Story of Rock Wool Home Insulation"
U.S. Bureau of Mines
4800 Forbes Street
Pittsburgh, Pa.

"How to Finish Plywood"
Douglas Fir Plywood Association
Tacoma Building
Tacoma, Washington

Filmstrips

"Safety Knowhow in the Workshop"
55 frames
Society for Visual Education
Chicago, Illinois

ELECTRICITY

Books

Richter, H. P. Wiring Simplified. Minneapolis: Park Publishing Company, Inc. 1959.

Electric Wiring for Home or Farm. Chicago, Illinois: Sears, Roebuck and Company. 1953.

Stetka, Frank and Abbott. National Electrical Code Handbook. New York: McGraw-Hill Publishing Company. 1963.

Films

"Cutting and Threading Pipe on Power Machines"
National Association of Plumbing-Heating
Cooling Contractors
1016 20th Street, N.W.
Washington, D.C. 20036

"Cutting and Threading Pipe by Hand"
National Association of Plumbing-Heating
Cooling Contractors
1016 20th Street, N.W.
Washington, D.C. 20036

MASONRY

Books

Bricklaying Vocational Training. (Set of 4 Volumes). Washington, D.C.: Structural Clay Products Institute. 1958.

Concrete Technology. Chicago, Illinois: Portland Cement Association. 1961.

Dalzell, Ralph J. Simplified Masonry Planning and Building. New York: McGraw-Hill Publishing Company. 1955.

_______ and Gilbert Townsend. Masonry Simplified. (Volumes I, II). Chicago: American Technical Society. 1956.

Mathematics for Masonry Trades. Albany: Delmar Publishers. 1955.

Films

"How To Transport, Place, Finish, and Cure Quality Concrete"
Portland Cement Association
33 West Grand Avenue
Chicago, Illinois

PAINTING

Books

Holtrop and Newell. Coloring, Finishing and Painting Wood. Peoria, Illinois: Charles A. Bennett. 1961.

Painting and Decorating Encyclopedia. Ed. by William Brushwell. Homewood, Illinois: Goodheart-Willcox Publishing Company. 1964.

Filmstrip

"The Story of Coated Abrasives"
Manufacturers Institute
711 3rd Avenue
New York 17, N.Y.

Pamphlets

"Indoor Painting"
National Paint, Varnish, and Lacquer Association
1500 Rhode Island Avenue, N.W.
Washington, D.C.

"Outdoor Painting"
National Paint, Varnish, and Lacquer Association
1500 Rhode Island Avenue, N.W.
Washington, D.C.

PLUMBING

Books

Althouse, A.D., and C.H. Turnquist. Modern Welding Practices. Homewood, Illinois: Goodheart-Willcox Publishing Company. 1958.

Babbitt, Harold E. Plumbing. (3rd edition). New York: McGraw-Hill Publishing Company. 1956.

Jennings, R. F. Gas and A.C. Welding and Cutting. Bloomington, Illinois: McKnight and McKnight Publishing Company. 1962.

Mathias, A. J. and Esles Smith. How to Design and Install Plumbing. (4th edition). Chicago: American Technical Society. 1961.

Plumbing and Pipe Fitting Industry, The. Natchitoches, Louisiana: State Superintendent of Education. 1955.

Stieri, Emanuels. Sheet Metal Principles and Procedures. Englewood New Jersey: Prentice Hall Publishing Company. 1960.

Films

"Cutting and Threading Pipe by Hand"
National Association of Plumbing Contractors
1016 20th Street, N.W.
Washington, D.C. 20036

"Cutting and Threading Pipe on a Power Machine"
National Association of Plumbing Contractors
1016 20th Street, N.W.
Washington, D.C. 20036

"Laying Out and Installing Hangers"
National Association of Plumbing Contractors
1016 20th Street, N.W.
Washington, D.C. 20036

"Measuring Pipe, Tube and Fittings"
National Association of Plumbing Contractors
1016 20th Street, N.W.
Washington, D.C. 20036